The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXIX. August 5, 1933 No. 736

Notes and Comments

Chemical Mergers

THE projected merger between Imperial Chemical Industries, Ltd., and the Chemical and Metallurgical Corporation announced in our last issue inevitably raises the question of the value to the country, and the advisability, of these large amalgamations. A few years ago "rationalisation" took its place in the cynic's vocabulary alongside "Mesopotamia" and "abracadabra," but although the industrial world has realised that rationalisation is no longer the universal panacea it was once thought to be, many of the amalgamations then made have persisted successfully, and more have materialised. Those unskilled in high administrative matters may be pardoned for being a little hazy as to the true value of mergers.

Horizontal amalgamations, the combination of a group of firms engaged in the same trade and at the same stage of production, has the effect of removing internal competition in the trade and of enabling all the amalgamated undertakings to pursue the same policy. An important aspect of the unified policy is the avoidance of price cutting. Unremunerative or surplus factories can be closed and waste can be prevented—in theory at all events. The vertical amalgamation, the combination of different undertakings carrying out successive stages in production from the raw material to the finished article, has some of the advantages of the horizontal combination. In addition it renders the concern independent of the vagaries of the outside market; speculative price fluctuations no longer affect the supply of materials whilst the power to centralise operations may enable one stage of the process of manufacture to utilise the otherwise wasted by-product of another stage, as for example the utilisation of blast furnace gas and coke oven gas by centralising the manufacture of coke, iron and steel. Each of the constituent firms is guaranteed work so long as the whole concern can sell its ultimate finished product, for the constituent firms need no longer be under the necessity of obtaining their contracts by fierce competition. Clearly, then, the essence of either type of amalgamation is the increased power to sell the final products remuneratively, either because the processes of manufacture are cheapened by avoiding waste, or because the increased power of the undertaking enables an economic price to be secured for the products.

A Result of Modern Conditions

THAT these steps have become necessary is the result of modern business conditions. Severe competition has forced prices down to unremunerative limits. Old-established manufactures are threatened by new products. Machinery has created a new order of things and has rendered itself indispensable for success, but machinery is expensive so that the small undertaking can no longer keep pace with its more powerful neighbour. Success, under these conditions, goes to the undertaking with the largest capital resources. Even so, however, there would be no need for these huge mergers if the purely domestic market and domestic competition was the only significant factor. Amalgamations, on the small scale it is true, were not unknown a hundred years ago. The essential difference, however, lies in the incidence of the foreigner. The predominance of Britain as a manufacturing nation has become dimmed. It is yearly becoming more difficult to place our goods abroad. The imposition of tariffs shows that foreign firms can even compete in our own markets in such fundamentally British manufactures as iron and steel. Our readers know, without being prompted by us, to how many chemicals the same applies. It was never more true that "unless we hang together we shall hang separately." The elimination of unremunerative or surplus undertakings, the lowering of production costs, independence in regard to primary products and raw materials, greater financial strength, all are necessary if this country is to meet international competition.

Against this it may be urged that the large concern, whilst successfully achieving most of the objects just enumerated, fails to secure truly economical working because it has become too large to admit of thorough control. There is much to be said for the smaller business as an efficient unit. The manager and the directors are known to every man; the activities of every man are under their immediate supervision. To the workers the concern is a more personal matter; more care is taken of the firm's property, and the processes are more rigorously controlled. There are many similar directions in which the small concern is the more efficient, unless it happens that the large business is served by an unusually efficient staff and is controlled by an unusually "water-tight" system.

Increased Efficiency

UPON this view amalgamation does not necessarily make for efficiency, and the very size of the concern may defeat its own ends. There are many industrialists of high reputation who support this view. At a conference of the Business Works Management Association last year, Mr. E. J. Fox, managing director of the Stanton Iron Works, gave it as his opinion that rationalisation is an experiment which does not seem likely to give in practice the success it theoretically

promised. His view was that many of the larger units already formed would again disintegrate into their smaller components. The view has also been put forward that when a firm has become so large that its employees feel themselves to be merely cogs moving without exercising any visible influence on the whole, that firm has out-grown its usefulness. Nevertheless, and in despite of Mr. Fox's quoted objections, the British iron and steel industry is moving in the direction of inter-collaboration and the Continental iron and steel industry has long since done the same. To come to our own industry, it cannot be said that Imperial Chemical Industries has been unsuccessful, whilst in a kindred industry, the Anglo-Persian Oil Company has, in face of a very difficult situation, achieved success which must have escaped a smaller concern. Imperial Chemical Industries, for example, can show following results over very difficult years:—

	Profits (after deducting reserves set aside).	Percentage Profit (after making all deductions).
1927	£4,158,247	7·3
1928	4,488,243	7·7
1929	5,397,841	8.2
1930	4,629,757	6.1
1931	3,668,685	4.8
1932	4,915,423	6.4

In view of the difficulty of controlling a huge undertaking to obtain the maximum efficiency, how is it that huge amalgamations have been so successful? The answer, we think, lies along several lines. These lines are fundamentally important for they indicate the conditions necessary to achieve success by large mergers. In the first place there is a balance between the less economical working of a very large—an "impersonally" large—concern and the economies effected by the means discussed previously. The amalgamation will be successful only when real benefits accrue from the rationalisation aspect of the merger. When a concern exceeds a certain size and stretches out its tentacles throughout the world, it has in its own sphere an influence comparable only with that of the Government itself.

Virtual World Monopolies

THE recent Iraq oil dispute provides a case in point. By reason of its financial and business strength the very large concern can buy or otherwise obtain virtual world monopolies in certain directions and where there is competition it will find competitors more anxious to make amicable arrangements whereby all can live than to fight a commercial battle wherein the issue must be doubtful. If, for example, two or three huge concerns divide the world's dyestuff requirements between them, it is easy for all to agree to live. It is almost impossible to make and enforce such arrangements if the existing capacity be spread over a hundred fiercely competitive firms. The combine, again when sufficiently large, gives greater stability in prices and profits, though the very stability may be disadvantageous if the demand is capricious and the market prices fluctuating. That stability, however, is no light advantage is proved by the continuing profits of I.C.I., just given, over a period of great depression, and by the experiences of the great banks. It is recorded that in the years 1825-1826 sixty-three private banks outside London failed; in 1840, twenty-four; in 1841, twenty-six. There have been no failures of importance since 1890, notwithstanding 1914 and the present crisis. Finally the huge concern can do far more in the way of research and development than twenty smaller concerns aggregating the same financial capacity.

The recent expenditure of one million pounds by I.C.I. into research on hydrogenation is an instance of something that could not have been done by the smaller firms, nor could any smaller undertaking have lightly commenced to manufacture oil from coal by the hydrogenation process in view of the very large capital outlay involved. There can be little doubt that, in this way, I.C.I. has by its very size and strength gained a virtual monopoly in a new manufacture that may before many years have passed be of equal importance with the dyestuffs, the synthetic ammonia, and the coal carbonisation industries. The moral seems to be that it is well for a country that these huge combines should exist provided that they are wisely governed, but that excessive centralisation should be avoided in order to retain as far as possible the individual and personal conception of service which alone is best fitted to the mentality of the British. The Briton is an individualist at heart. Let us beware, in our quest for power, of taking away his initiative. Perhaps the British Colonial Civil Service is the outstanding example to industry of the way to do things.

The Economic Conference and After

THE Conference, from which so much was expected in some quarters, has decided that nothing can at the moment be done internationally towards putting world industry back into working order. For the time being each country must do its best to work out its own salvation. Nevertheless, the tide has definitely turned, and the figures for each succeeding month show a slow but steady improvement. This is a time for courage and boldness, for confidence that the small improvement already noticeable will not only continue but increase, and for a strong determination to do what can be done to help forward the movement. Plant of all kinds is cheaper to-day than it will ever be again in our time, for the price of materials has already risen and, unless we are mistaken, will continue to rise. At present one can not only get cheap plant but get quick delivery of it. Credit, too, is plentiful, and there should be no difficulty in financing any reasonably sound proposition, but these conditions will not last indefinitely.

Manufacturers should not worry if sales are poor for the moment. They should get together in a spirit of mutual confidence with customers and learn from them what plans they are making for trade expansion and what their future requirements are likely to be, and act accordingly. Let them take a long view so as to be ready when the rush comes, as come it will; meantime build up demand by judicious advertising. It is no use modernising processes and plant and adding new lines unless they let everybody know about it. Finally, let them not hesitate to call in expert assistance, technical or commercial, if in doubt on any question. If they do not know who to send for to help them we invite them to write to us and we will put them on the right lines. We are convinced that if everyone would do his bit, however small, towards replacing imported chemicals by home-manufactured goods, and towards reducing costs by modernising processes, the cumulative effect upon our industry would be enormous, and *now* is the time to make the effort.

British Colour Users and Dyestuffs Prices

Sir Henry Sutcliffe Smith's Presidential Address

THE annual meeting of the Colour Users' Association was held on August 1, in Manchester. Sir Henry Sutcliffe Smith presided. It was announced that the elected members of the council for the year 1933/4 were as follows:—

Elected by amalgamated companies:—Bleachers' Association, E. Carr Deakin; Bradford Dyers' Association, Sir Henry Sutcliffe Smith, James Ewing, Thorp Whitaker; British Cotton and Wool Dyers' Association, C. Rawson, P. Caldwell, E. T. Holdsworth; Calico Printers' Association, C. C. Railton, Forrest Hewit, W. E. Kay; J. & P. Coats, Ltd., T. W. Hirst; English Sewing Cotton Co., Ltd., Peter Ermen; English Velvet and Cord Dyers' Association, A. A. Crabtree, G. E. Holden; Leeds and District Worsted Dyers' and Finishers' Association, C. W. Wade; Smith, Stone and Knight, Ltd., T. Parker Smith; F. Steiner and Co., Ltd., T. R. Fothergill; United Turkey Red Co., Ltd., J. F. Christie; Wallpaper Manufacturers, Ltd., Osmund Smith; Yorkshire Indigo, Scarlet and Colour Dyers, Ltd., George Hodgson.

Elected by trade groups:—Calico printing, A. Davidson, W. L. Dixon, E. Drew; Wool dyeing, Henry Blackburn, George Garnett, H. Jennings, C. M. Whittaker; Cotton deying, W. W. L. Lishman, G. H. Oldham, W. Watson; Silk dyeing, Gilbert Tatton; Garment dyeing, H. L. Mitchell; Paints and pigments, Thomas Taylor; Miscellaneous, J. R. Denison.

Sir Henry Sutcliffe Smith's Address

Sir HENRY SUTCLIFFE SMITH referred to the fact that last year the Dyestuffs Industry Development Committee issued another report on the position of the dyestuffs manufacturing industry in 1932—its previous report having been made in July, 1930. The views of the two representatives of the Association on this committee differed so widely from those of the majority, mostly dyeware makers, that they were unable to sign the general report. After consultation with the Association, they submitted a separate memorandum stating a case against the continuation of the Act. The majority recommended "that the Dyestuffs (Import Regulation) Act, 1920, be continued on its present basis for a period of three years," and two of the members signing recommended that the period should be five years. The Association's representatives, on the other hand, recommended that the Act should be allowed to lapse at December 31, 1932, and their views were embodied in the report.

The British Colour Council was sparing no effort to assist colour users by effecting a reduction in the number of colours used, and was endeavouring to eliminate the present confusion in the matter of colour nomenclature. This work should be of the greatest service to all organisations using colours, if only from an economic standpoint. It is the intention of the council to issue shortly a standard shade card, and this will be supplemented from time to time by further cards giving the season's shades.

Progress in Dyestuffs Production

Last year he referred to the marked increased in the production of British dyestuffs in 1931 compared with 1930, the figures then quoted showing an increase of 12½ per cent. The revised figures recently published by the Board of Trade showed that the increase of 1931 over 1930 was actually 14 per cent. The published figures for 1932 showed further progress, recording an advance of 1½ per cent. compared with 1931. The following table shows that last year the manufacturers achieved a production of more than five times the pre-war figure and nearly 2½ that of 1922.

	lb.	Index Figure.
1913	9,114,134	100
1922	20,802,563	228
1923	33,100,719	363
1924	33,242,704	365
1925	32,693,402	359
1926	30,297,000	332
1927	39,551,756	434
1928	50,907,080	559
1929	55,785,032	612
1930	42,590,243	467
1931	48,621,073	533
1932	49,380,266	542

Imperial Chemical Industries, Ltd., was continuing its policy in the field of research. Not only in the organisation itself, but also in its relationships with the universities and other research bodies, there was a continuance of the excellent work begun some years ago. He could not point to any particular outstanding discovery made in the dyestuff industry during the past year, but a number of new and useful colours had been produced. In particular he mentioned the vat and acetate silk colours. There had also been a number of other new products of interest which, although not directly connected with dyestuffs, were of great value to the country, in particular to agriculture and to the textile, rubber and varnish industries. He congratulated the dyestuffs industry on these achievements, and paid a tribute to all British manufacturers, not only for their excellent service and high technical skill, so freely placed at the disposal of the colour users, but also for the high standard of quality of their productions.

Increased Exports

As would be seen by the following table, the value of exports of dyestuffs and intermediates in 1932 exceeded the high figure recorded in 1931:—

Year.	Weight Tons.	Value £
1913	2,434	177,246
1925	5,208	847,639
1926	3,793	614,419
1927	3,892	658,464
1928	5,199	806,533
1929	7,844	984,222
1930	5,381	884,974
1931	5,864	1,016,238
1932	5,850	1,039,087

British makers were realising more and more the importance of increasing their share of world trade as shown by these export figures. There was no reason why Great Britain should not be one of the leading producers of dyestuffs for the world's markets, having in mind her valuable source of raw materials and her undoubted skill in organic chemistry.

Sir Henry congratulated Professor G. T. Morgan, of the Department of Scientific and Industrial Research, on the fact that the ether extractor, to which he referred last year, had proved a commercial success. L. B. Holliday and Co., Ltd., had made great headway through its use and had been able to meet all demands for resorcine, both for technical and pharmaceutical purposes. Further evidence of the usefulness of these various research bodies was afforded in the production of "Shirlacrol," a wetting-out agent, resulting from investigations at the Chemical Research Laboratory on the chemistry of low temperature tar and vertical retort tar, which Professor Morgan and the British Cotton Industry Research Association at Shirley Institute had recently introduced to the trade. There were, however, still many important intermediates imported, and these research associations, by their investigations, were doing valuable works in inducing British manufacturers to extend their productions.

British Production of Benzol

It was to be noted with regret that phenol had been allowed to be imported recently in quantity into this country. If the quantity produced by the domestic coal tar distillation industry was not sufficient for the expanding demand of the plastics industry, it was surprising that the dyestuff industry had not been encouraged to supply synthetically produced phenol.

Statistics furnished by the Board of Trade showed a decrease of over 20 per cent. in the quantities and values of dyestuffs and intermediates licensed for importation in 1932 compared with 1931. The reason for this decline was the fact that towards the end of 1931 important changes took place in the economic conditions of this country. Between September and the end of the year imports increased considerably, and in the last quarter of that year their value exceeded the average for the previous quarters by nearly 50 per cent. When, however, the full effect of the abandonment of the gold standard was felt, and higher prices came into force at the beginning of 1932, imports dropped to the normal level again. It would therefore be seen that imports had been

remarkably consistent in weight and value during the last six years. For the last few years these imports had consisted almost entirely of dyestuffs not made in this country, and as and when the British makers extended their range and the foreign colour become automatically prohibited, it was vitally necessary for the German and Swiss makers to place on the market some new dyestuff or speciality if they were to maintain their level of exports to this country. Insofar as they succeeded in accomplishing this object, they gave definite evidence of the progressive methods employed by them.

Licences Granted in 1932

The number of licences dealt with by the Licensing Committee in 1932 aggregated 5,479 as against 6,822 in 1931 and 6,000 in 1930. Notwithstanding the revised procedure adopted by the Licensing Committee in 1931 as regards applications on price grounds, whereby foreign quotations were divulged only to neutral members of the committee, the effect which the users anticipated had not materialised—foreign quotations for "contentious" colours were still withheld from the British user.

Last year, he protested against the considerable advance in prices made by the British makers at the moment when they were making great efforts to reduce production costs. Dyestuff prices were out of conformity with world wholesale prices; the index figure for dyestuffs still remained approximately at 200, as against the Board of Trade wholesale commodity index figure of 101.7 (June 1933). Industrial prosperity would not be restored until wholesale prices had been substantially increased throughout the world, but each section of the trade was so interdependent that it was hardly equitable that any one component part of the cost of production should be far in excess of the general level. The colour using industries, whose productions bulked so largely in the exports of this country, must be assured that they were not handicapped in their efforts to compete with other nations. There was an undoubted danger that the price of benzol would tend to encourage the importation of intermediates, which was contrary to the whole spirit of the development of the British dyemaking industry.

The Dyestuffs Act

Having reviewed the circumstances which led to the continuance of the Dyestuffs (Import Regulation) Act, for a further period to December 31, 1933, Sir Henry recalled the fact that the Government had asked the Import Duties Advisory Committee to undertake an inquiry under the following terms of reference:—"To consider the position that will arise on the expiry of the Dyestuffs (Import Regulation) Act, 1920, and in particular to advise whether the interests of trade and industry in the United Kingdom, including those of users as well as makers, will best be served by (a) the continuance of the Act and, if so, for what period and under what conditions; or (b) the discontinuance of the Act, and, if so, whether in that event imported dyestuffs should (1) be exempted from the general ad valorem duty imposed under the Import Duties Act, 1932; (2) remain liable to the general ad valorem duty; or (3) become liable to additional duties under the Import Duties Act, 1932, in addition to the general ad valorem duty, and if so, at what rates of duty."

At the request of the committee, the Association presented a complete case, coupling with its recommendation that the Act should come to an end, its protest against any tariff on dyewares. After this case had been submitted the Association was asked to appear personally before the Import Duties Advisory Committee. The Dyestuffs Advisory Licensing Committee was also asked to give a full statement of the present working and effect of the Dyestuffs (Import Regulation) Act. A statement was drawn up reviewing the work which the Licensing Committee carried out.

Joint Committee's Statement

Apart from this statement, however, there were certain points on which the committee was not in complete accord, and various members, comprising a majority of the committee, submitted an additional report. The Joint Committee of Cotton Trade Organisations submitted a statement of its views on the dyestuffs question to the Import Duties Advisory Committee. This statement supported the application of textile finishing trades that the Dyestuffs Act should be discontinued and that imported dyestuffs should be exempt from duties of any kind. It emphasised the magnitude of the interests involved in the cotton industry as compared with those of the dyestuffs industry, pointing out in particular the great disparity in the amount of employment provided by the two industries, early 400,000 in the cotton industry, as against 7,000 engaged in dye-making. The joint committee also pointed out that the cotton industry had to face unrestricted competition in its export markets, and urged that it could not afford to support the dyestuffs industry in the British home market.

The users' case had been presented to the Import Duties Advisory Committee by every representative body, and no matter what its final decision might be he was satisfied that every possible step had been taken to bring the facts to light. He expressed appreciation of the courtesy and kindness with which they were received by the Import Duties Advisory Committee. It must be realised that the national economic policy had undergone a considerable change, but whatever policy was decided upon as regards the manufacturing of dyewares in this country, it was essential that the consumers of dyes should be safeguarded against exploitation. He was convinced that the interests of both makers and users would be best served by a policy of helpful co-operative effort.

Foreign Quotations

Mr. F. O. ASHMORE said there was a somewhat important matter mentioned in the chairman's speech to which he would like to refer as he was not quite clear what it meant. It was sated that foreign quotations were not divulged to anyone except neutral members of the Licensing Committee. His impression was that the Council was informed that the Licensing Committee did not agree to this procedure.

The CHAIRMAN said he thought it was agreed to.

Mr. ASHMORE said he thought that the report to the Council was that it was not agreed. That was certainly his impression. It was rather a serious matter. It was said that the contention of colour users had not brought about the desired results.

The CHAIRMAN replied that, as a matter of fact, there had been very few applications on price grounds, and he thought that when there was one the procedure would be as outlined in his opening statement. He would make a note of the point.

Mr. A. K. DAVIS, president of the Association, proposed a vote of thanks to Sir Henry Sutcliffe-Smith for the valuable services he had rendered so consistently to the Association and for presiding as chairman of the meeting. As regarded Sir Henry Sutcliffe-Smith's suitability for the office of chairman which he had held for so many years, the report afforded ample evidence of his sterling worth.

The vote of thanks was carried with acclamation.

Ammonium Sulphate Manufacture

Process for Production of Dry Neutral Salt

SOME particulars of the new Fauser process which obviates the necessity for working with saturators, centrifuges and driers—all of which are subject to serious corrosion—appear in a recent issue of "Industria Chimica" (page 1343). Large scale operation in Holland, Belgium, and Poland has confirmed its efficiency.

The reaction between sulphuric acid (52° Bé) and gaseous ammonia is carried out in a cylindrical chamber, the size of which will depend upon the desired output. In the atomised form, the acid comes into contact on the counter-current principle with the ammonia gas entering through openings uniformly spaced round the sides of the chamber. Any non-reacted ammonia which is swept forward with the water vapour meets a stream of sulphuric acid in the scrubber which is fitted with Raschig rings. Complete neutrality of the salt formed is ensured by maintenance of the ammonia content of the chamiber gases at a level which does not fall below 12 to 15 per cent. The product accumulates on the floor of the chamber from where it is removed by means of a travelling worm, arrangements being made for returning ammonia vapour to the scrubber. To obtain the sulphate in a granular form which is convenient for fertiliser purposes, a little water is incorporated during discharge from the chamber and the very slightly moistened mass is dried in a rotary oven.

The Recovery of Wool Grease from Sewage

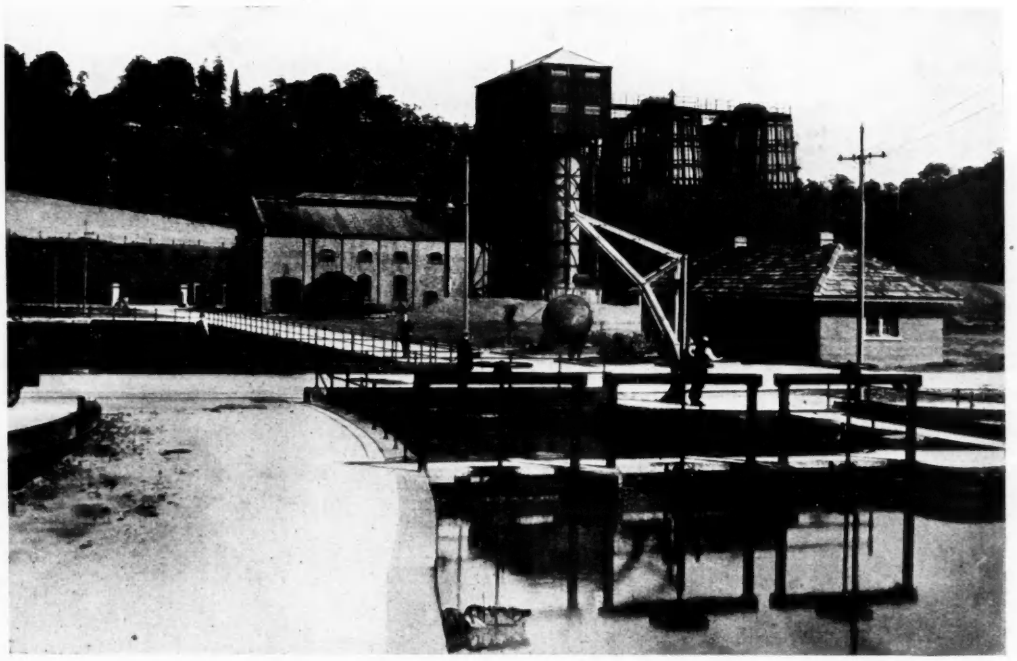
Operations at the Bradford Corporation Esholt Works

THE operation of the Esholt Works of the Bradford Corporation, where large quantities of wool grease are recovered from sewage, was the subject of a paper presented by Mr. H. Wonter-Smith, sewage works engineer, at the annual summer conference of the Institute of Sewage Purification, held at Bradford, July 6—8.

The sewage entering the Esholt Works is composed of approximately half domestic and half trade waste. The latter consists of crude wool scouring effluents, seak tank effluents from wool scouring treatment plants and various dye liquors. Typical analyses of wool scouring liquors are as follows :—

WOOL SCOURING EFFLUENT.

Grease	2,220.0	parts per 100,000.
Suspended matter ...	3,030.0	,, ,, ,,
Oxygen absorbed ...	234.0	,, ,, ,,
Alkalinity	612.5	,, ,, ,,



Esholt Sewage Works, Bradford: The Sulphuric Acid Plant.

TREATED WOOL SCOURING (SEAK TANK) EFFLUENT.

Grease	144.0	parts per 100,000.
Suspended matter ...	315.0	,, ,, ,,
Oxygen absorbed ...	117.9	,, ,, ,,
Acidity	102.9	,, ,, ,,

The dye liquors are too varied in character to enable separate analyses to be given, some being acid and some strongly alkaline, according to whether they are from the wool, or silk industries.

The sewage flows across the Aire Valley in three lines of 48 in. diameter pipes constructed in the form of inverted siphons, each of the three pipe lines being capable of passing 30 million gallons per day. At the point of discharge at the sewage works sulphuric acid is added as a precipitant. The acidified sewage then passes through a specially designed mixing tank of 445,000 gal. capacity, where the precipitate is kept in circulation, being gently turned over by means of baffle boards suitably placed across the natural flow. An improved cracking of the soaps and a reduction of the colloidal content is thus obtained. After mixing, the sewage flows forward to the precipitation tanks which are arranged in two series, there being twenty tanks for the acid cracking process and a further twenty for secondary precipitation. The tank effluent then passes by way of a conduit to 53 acres of bacterial filters, and from these filters it passes down the main effluent conduit to the River Aire. The sludge from the detritus tanks and the precipitation tanks gravitates in sealed mains to a screening plant where it is blended and screened. From this plant the sludge is lifted to the sludge disposal building and there treated for the extraction of grease and water, leaving a residue of value as manure.

Mixing and Precipitation

At the precipitation tanks site, as already mentioned, the sewage is treated with sulphuric acid, the object being to crack the soaps in the sewage and precipitate a good deal of the dissolved organic matter, the wool waxes and the suspended matter being carried down in the process. This means that a varying quantity of acid is required, ruled by the alkalinity of the incoming sewage at various periods of the day. The process is controlled by an assistant who takes samples frequently (about every quarter of an hour) during the day and regulates the amount of acid in order to produce a sewage which is about 10 parts per 100,000 acid, using methyl orange as an indicator. It was the custom until recently to acidify the sewage during the whole of the 24 hours, and when this was done the amount of acid used in twelve months amounted to some 20,000 tons. This was not only a great expense but it was found that the filtration of an acid sewage had limits, and that probably considerable sums of money could be saved and better final results obtained if the grease could be collected by the use of less quantities of acid. After exhaustive experiments it was found that the best results in filtration were obtained when the *pH* value of the tank effluent was about 6, and therefore with this in view a reduction of the amount of acid used has been standardised without prejudicing the amount of grease collected. In this way it is now the custom to only use acid when actual wool suds are arriving at the works. Under these conditions 12,000 to 13,000 tons is sufficient.

The design of the tanks at Esholt is an extremely satisfactory one for the purposes required. They are so designed

that they may be worked either in parellel or in series. Inlet and outlet weirs the full width of the tanks are arranged so that the film of water flowing into and out of the tanks is very regularly and quietly governed throughout the whole length of flow. In this way excellent settlement is secured and it is seldom that the suspended solids passing from these tanks exceed 7 parts per 100,000 with only minute traces of grease. One of the values of the acid cracking process is the preservation of the sludge collected in the tanks which secures entire freedom from smell and enables dense sludge to be collected. This is a very great asset when dealing with sludges because, whilst Bradford works up a sludge in the neighbourhood of 80 per cent. water, some other towns are unable, owing to the necessity for frequent emptying, to produce a sludge of less than 90 per cent.

Sulphuric Acid Plant

The sulphuric acid plant at the Esholt works supplies 9,000 tons of acid per annum which is part of the total requirements of the department. The remainder, up to a further 5,000 tons, is obtained from the Corporation Gas Department where spent oxide is roasted in hand-operated furnaces in order to produce the sulphur dioxide gas for making the acid. The plant at Esholt is a modern chamber plant, one of the few complete new installations built in this country since the war. About 5,000 tons of pyrites is roasted in two specially designed mechanically operated Herreshoff type furnaces, a third unit having been provided as a spare. The quantity of acid mentioned is in the from of 140° Tw. acid (77.17 per cent H_2SO_4), known in the trade as brown oil of vitriol (B.O.V.). The sulphur content of the raw material is 48 to 49 per cent., of which 46 to 47 per cent. is available for acid making. The oxidation of the sulphur dioxide is trioxide is effected by means of nitric acid, which is introduced at the top of the Glover tower. The amount of nitric acid used annually amounts to 130 tons.

At the present time the furnaces are roasting approximately 96¼ tons per week of raw material regularly, and the plant is producing 174 to 175 tons of acid (rated as 140° Tw.) in the same time. The working efficiency of the plant is 97 per cent.

The handling of the sludge from the pricipitational mixing tanks is a very important part of the process of dealing with the sewage of the city, and a great deal of research work has been done in this direction. The method of working has been continuously improved in detail over many years past and the plant is working to-day more economically and more smoothly than ever in the past. The process of sludge disposal is necessarily a hot process because only by this means can the grease be successfully expelled. The daily supply of 80-83 per cent. sludge, after being mixed with its due proportion of gritty sludge from the detritus tanks in the proportion of 1 to 6, is passed to large 7-ton vats where it is heated by means of steam coils. The temperature is there raised to as high a point as possible (about 170° F.) at which point it rather tends to froth.

When at the required heat the sludge passes to large displacement vessels in the basement from whence it is forced up by compressed air to 128 presses in the press-house. Here the sludge is filter-pressed through cotton cloths by alternately feeding-in hot sludge and super-heated steam (to keep up the temperature). Liquid grease and water are discharged in the process. Some 40,000 cotton filter-press cloths are used annually for this purpose, the life of a cloth being under good conditions from 6 to 8 weeks. The presses are operated for varying times according to the nature of the sludge to be pressed, but 64 hours' pressing is the usual practice. In that time the grease content of the cake is reduced to about 16 per cent. on the dry solids as compared with 40 per cent. in the original sludge, the water content of the cake being about 26 per cent.

Wool Grease Recovery at Esholt Sewage Works, Bradford : The Filter Press House.

The Grease House

The grease house contains six 7-ton capacity steel vats lined with blue bricks and provided with open steam coils for sludge boiling, and sixteen 7-ton capacity steel grease vats (lead lined), and provided with open steam coils for grease boiling. Acid supplies are piped to each separate vat. The sludge boiling vats are each hooded and the gases are led away through a main of 20 in. in diameter made of acid-resisting metal to a tower placed in the open at the south end of the building. This tower is 9 ft. in diameter and 32½ ft. high, filled with brush-wood through which a well distributed stream of water is allowed to fall. This has the

effect of scrubbing the gases, and goes a long way in preventing the emission of smells. Accommodation is provided within the building for barrelling grease, three separate platform weighing machines being available in the length of the building, and two 4 in. steam-driven pumps have been installed for pumping hot naked grease direct into motor or railway tank wagons.

In the basement, a plant is provided wherein is collected all the hot liquor which passes from the sludge presses in 12 in. × 12 in. open wooden troughs suspended under the floor. The water and grease are separated by natural means in vessels, two in number, of 22,000 gal. combined capacity. When required the grease is allowed to flow over a weir to a sump, whence it is pumped to the grease vats on the floor above for further purification. At all other times, the water is siphoned from beneath and thus prevents the floating grease from rising to the level of the overflow. This highly polluting water, known as "press liquor," discharges to a tank fitted with scum boards, and then to two automatic ejectors each of 250 gal. capacity, which force the liquor through an 8 in. main 770 yd. in length and against a total head (including friction) of 73 ft. to the mixing tanks, where it starts through the process of purification again.

The Filter Press House

A separate plant deals with residues from the sixteen grease vats, in which the grease is freed from water and dirt to a point below 2 per cent. This waste contains acid, grease and mud, and caused undesirable scum when mixed with the ordinary press liquor. It is therefore passed to a storage vessel of 2,000 gal. capacity and thence lifted by means of an automatic air pump to the sludge boiling vats. In this basement are also placed six 7-ton capacity displacement vessels which receives the hot sludge from the vats on the floor above and by means of air pressure force the sludge to the presses and maintain the load on the mains feeding them; a grease storage tank of 1,000 tons capacity; and an ozonair plant which circulates a small quantity of ozone into the apex of the roofs of the grease and press houses. Here certain odiferous compounds in the gases are oxidised before issuing forth into the atmosphere. Since the adoption of the various methods of treatment previously given, notably the elimination of the bulk of the storm water sludge, it is only necessary to use this plant occasionally.

The press house contains 128 sludge presses in four rows of 32, each weighing 15 tons when fully charged, the total load on the floor thus being 1,920 tons. Each press contains 46 plates measuring 36 in. × 36 in., and has a capacity of 32 cwts. of cake containing 26 per cent. moisture with a thickness of cake of 1½ in. The presses are automatically opened and shut by compressed air, but owing to the conditions of work they have to be finally tightened by hand in order to be steam tight. The basement is left free for the automatic loading of sludge cake into wagons as the presses are opened.

The cake from the presses and still in its hot condition is stored in large heaps in the open. In this way it is found that the grease content is reduced due to the "heating" of the material which is really a chemical action bound up with the growth of moulds; this hot condition also melts some of the grease which tends to settle to the bottom of the heaps. No buildings are necessary in connection with this work which is not affected by ordinary weather conditions. At the end of twelve months these heaps are broken into by grab and the material is passed through a disintegrator which grinds the dried cake to a fine powder which finds a ready sale on the market.

Questions and Answers

Technical, Industrial and General

WITH a view to promoting closer co-operation between members of the chemical industry who are in search of information on technical, industrial and general points and those who are in a position to supply their requirements, a selection from the large number of questions received is given under this heading. It is important that the full data in regard to each question that is asked should be put before us, or the answers given will have less value than they might otherwise possess. In cases where the answers are of general interest, the answers are published; in others, the answers are simply passed on to the inquirers. Readers are invited to co-operate in supplying information on the subjects of the queries and in augmenting replies already given.

199.—PURIMACHOS CEMENT.—We shall be glad if you could advise us who produces this material and what it is.

"Purimachos" cement is a plastic fire cement extensively used for patching fireclay retorts. It is supplied by Purimachos, Ltd., of St. Philip's, Bristol. This firm has been making fire cements since 1882. One of its other well-known products is "Drykos" cement, this is a dry fire cement for high temperature work.

200.—PRODUCTION OF ACETONE.—Where is it possible to find details of Weizmann's process for the production of crude, acetone, giving butyl alcohol as a by-product.

Weizmann's process is a biochemical one, employing a particular species of bacteria known as "BY." The new material is a starchy mass derived from maize. The production of acetone in association with butyl alcohol is attended by the evolution of carbon dioxide and hydrogen. The process was described in a lecture on the fermentation industries by Dr. J. V. Eyre ("Industrial Chemist," November, 1931); further details will be found in "Chemistry and Industry," 1926, *45*, 71, and "Industrial Chemist," 1926, *2*, 209.

201.—VARNISH COMPOUND.—We wish to be put in touch with a firm supplying a special varnish which when applied to metal surfaces, such as pump passages, and heated to a suitable temperature, will provide a very smooth surface unaffected by water.

Varnishes of this type are supplied by Bakelite, Ltd., 68 Victoria Street, London, S.W.1.

202.—RED LEAD.—Information is desired concerning a reliable method for estimating the purity of red lead.

Our correspondent was recommended to communicate with the Paint and Varnish Research Station, Waldegrave Road, Teddington.

203.—REDUCED IRON.—We should be glad to know the uses to which this material is put.

Reduced iron is chiefly used in the manufacture of pyrophoric alloys for petrol-filled cigarette lighters, and in compounding tonic waters.

Decaying Stonework

Effects of Atmospheric Pollution

EXAMPLES of the damage to buildings and monuments by atmospheric pollution were given by Sir Frank Baines in an address at the summer meeting of the National Smoke Abatement Society, Ltd., held in London, on July 14. Describing his researches into the decay of the stonework of the Houses of Parliament, Sir Frank said the main cause of the condition of this building was definitely atmospheric impurity, although it had been rendered vastly more serious owing to primary faults in the stone. The first stone was laid in 1840, and evidences of decay were discovered before the building was completed. During the ten years' period he had the structure under observation he found the presence of sulphate—which could only have been derived from the attack on the stone by atmospheric acid—in cracks and fissures as much as twenty inches from the surface, with the result that crystallisation had thrown off great pieces of stone. Even in a rapid summary inquiry more than thirty-five tons of such pieces of stone were picked off portions of the building by hand, without touch of tool or hammer, while some pieces lifted by crystallisation were over two tons in weight.

The Future for Oil-Coal Fuel

A Notable Discussion at the World Petroleum Congress

THE use of mixtures of oil and coal was discussed at the World Petroleum Congress on July 24, when Professor G. T. Morgan, F.R.S., was in the chair.

Dr. R. LESSING, who has acted as general reporter for this sub-section of the Refining, Chemical and Testing Section of the Congress, opened the discussion with a general summary of the subject and the papers. The problem of using solid and liquid fuels in intimate admixture for general industrial purposes, he said, is not new. The exigencies of the war, however, directed special attention to the possibilities of substituting indigenous coal for imported fuel oils, particularly for naval purposes. Towards the end of 1917, Capstaff and Sheppard began work on preparing colloidal mixtures of coal and oil, and this work led to intensive investigation by the American Submarine Defence Association, under the direction of Lindon W. Bates. At about the same time, and without knowledge of the work begun in America, he himself studied the problem on behalf of the Fuel Oil Section of the Admiralty. Exhibiting samples of oil-coal mixtures which were prepared at the beginning of 1918, Dr. Lessing commented on their remarkable stability at the present time. The exploitation of the preparation of "colloidal" fuels, he continued, was prosecuted by Bates after the war, but without leading to successful commercial application. Experiments carried out in England about 1922 by the Great Central Railway, with mixtures of Yorkshire coal or coke breeze, and creosote oil or fuel oil on locomotives gave satisfactory results, but were not followed by the use of such mixtures under regular service conditions. Although an immense amount of literature had been published, particularly in the immediate post-war period, on the subject, much of which was based on somewhat inadequate scientific evidence or interpretation, general interest in the problem showed signs of flagging, until it was revived in the summer of 1932 by the announcement that so important an undertaking as the Cunard Steam Ship Company had fitted out one boiler of s.s. "Scythia" for burning a 60/40 mixture of oil and coal, and that this vessel had made a voyage from Liverpool to New York, during which 150 tons of this fuel were fired. The results were stated to be satisfactory although the burners required more frequent cleaning than when oil alone was used. Interest was further stimulated by the news that experiments with mixtures of tar oil and coal on land boilers in Germany gave promising results.

Advantages of Oil-Coal Mixtures

The outstanding advantages of mixtures of oil and coal are many. Such mixtures can be stored in bunkers without interstitial air spaces. The bulk weight of an oil-coal mixture is higher than that of either coal or oil, and the calorific value per unit volume is also superior to either fuel by itself. It can be pumped from distant and inaccessible bunkers or double bottoms, without manual labour. Coal in such a combination can be fired through burners like gas, oil or powdered fuel, with the efficiency peculiar to this type of combustion. Ignition, both in burners and in high compression engines, is usually effected at a lower temperature or compression than when oil alone is used. The density of the mixture is higher than that of water. The fire hazard is therefore lower than with oil, as bunkers can be drowned nor is the mixture liable to spontaneous combustion like coal. The high density, moreover, tends to reduce the risk of pollution of harbours and coast lines with oil, provided the mixture is resistant towards the electrolytes in salt water. Lastly; the use of oil-coal mixtures permits home-produced solid fuels to be substituted for at least some of that portion of the fuel requirements of a country which for technical or other reasons must be supplied in fluid form.

There are, said Dr. Lessing, hardly any disadvantages to be put against them, provided technical perfection of the method of preparation is attained, whereby a homogeneous mixture is produced which remains stable in regard to the ratio of oil to coal throughout a bulk of commercial magnitude. The problem of effecting this stability, *i.e.*, the prevention of separation into the components over a lengthy period of time, had not yet been solved with absolute certainty, and nearly all work done in this branch of technology was directed towards this end. The necessity of reduction to a fine particle size of the coal to be used need not constitute a disadvantage, seeing that the pulverisation of coal is now practised on a very large scale. It merely means a certain expense which must be low enough not to affect unfavourably the economic side of the question. A disadvantage which must be borne in mind, however, was the ash content of the coal. It was not likely that this fuel would ever be generally acceptable, if high-ash coal slacks are used as raw material as was sometimes recommended by its protagonists. The first condition of success was the selection of coals of minimum ash content. If this requirement was not complied with, a fly-ash nuisance would be created which would militate against the adoption of oil-coal mixtures for most purposes.

Work at the Fuel Research Station

In the first paper presented, A. B. Manning described work carried out at H.M. Fuel Research Station on the stability of suspensions of coal in oil. He found that petroleum oils, such as paraffin oil and raw fuel oil, whose viscosity does not increase sufficiently with decreasing rate of shear to confer the required stability on coal suspensions therein, can be made to support pulverised coal (85 per cent. through 200-mesh I.M.M. screen) by previously dispersing 0.1 to 0.5 per cent of sodium stearate in the oil. The viscosity of the oil under normal conditions of flow is thereby increased, but not unduly. The viscosity at small rates of shear, however, increases rapidly as the rate of shear diminishes, and, indeed, becomes infinite under the shearing forces involved in supporting small particles of coal. In other words, towards such particles of coal, the dilute gel behaves as an elastic solid and will support them indefinitely. It is not essential that the oil should have a gel structure in order to confer on the coal-in-oil suspension the relative stability requisite for practical purposes (*e.g.*, no appreciable settling in six months). This degree of stability could be given by any treatment which affects the viscous properties of the oil in such a manner that its viscosity under low rates of shear has a sufficiently high value whilst its viscosity at the rates of shear involved in normal flow remains low enough to give suspensions which can be readily pumped, etc. Manning therefore concluded that the variation of the viscosity of an oil at low rates of shear is the determining factor from the point of view of the stability of suspensions of pulverised coal therein.

Utilisation of Brown Coal

Dealing with the production of "fluid coal from brown coal," G. Benthin attacked the problem primarily from a different angle. He recognised, as others have done before, that peptisation of coal can be effected by treatment with swelling agents, such as creosote or pyridine, prior to its incorporation with the oil. In view of the more active character of the humic acids (ulmins) of lignite as compared with those of bituminous coal, he therefore regarded brown coal as particularly suitable for preparing oil-coal fuels. Creosote, obtained in the carbonisation of brown coal, was a most suitable peptising agent because it contains constituents with OH- and COOH- groups polar to the same groups in the brown coal ulmins. The more concentrated the creosote is employed the better is the peptising power. Apart from this pre-treatment, preferably given after the coal has been dried to a moisture content not exceeding 10—12 per cent., gel formation took place in the oil by the addition of soaps or of alkali which can combine with the acidic constituents of the coal to soap-like substances. The ash content of the coal could be reduced by centrifuging the mixture, if it were possible to peptise the coal residum, *i.e.*, that portion insoluble in organic solvents and sodium hydroxide.

Experiences with fluid coal in Germany was dealt with in a paper by W. Schultes, who carried out a boiler test on behalf of the Vereinzur Ueberwachung der Kraftwirtscharft der Ruhrzechen in Essen with the care and thoroughness cus-

tomary with this Institution. The boiler was of the Cornish type. The fuel was supplied by Balcke, of Bochum, but neither the composition nor the mode of preparation were given by that firm. The coal used was a slack from the Friedrich Ernestine pit, of which the usual characteristics were ascertained. The oil on analysis was found to be the ordinary anthracene oil fraction of coal tar. The ratio of components was estimated to be 54.64 per cent. of coal and 45.36 per cent. of anthracene oil. Stripped of experimental details the work showed that after the boiler, which had been heated up by gas prior to firing the oil-coal mixture, had attained normal running conditions, the fuel gave a steaming efficiency of 81.5 per cent. The mixture was sufficiently fluid to be pumped and led from pressure vessels to the burners. No sedimentation of coal was observed during the two tests, which, however, were of only 6 hours' duration. The tests are interesting in that only coal and a coal product were employed in the preparation of the fuel.

A New Phase of Fuel Technology

At the conclusion of these papers Dr. Lessing briefly reviewed the present position of this phase of fuel technology. He said it must be conceded that whilst commercial success on an appreciable scale has not yet been attained, the technical and economic features of the problem of preparing and using oil-coal mixtures in substitution of neat oil fuel, show sufficient promise to warrant intensive study of the questions involved, some of which are of a somewhat complex nature. In view of the common interest of the producers of coal and oil in this matter, one might venture the suggestion that this is a case for joint research and whilst the difficulties of such an enterprise are fully recognised, the chances of success of such collaboration might be worthy of discussion.

Commander H. TOLLEMACHE said that *if* a successful mixture of oil and coal can be produced and at a commercial price it would, in many respects, possess definite advantages over either oil or coal used separately, particularly in marine work. The real problem was the tendency of the coal particles to separate from the oil and to settle at the bottom of the storage tank. The successful solution of this problem would seemingly place an oil-coal fuel among the world's most important sources of thermal energy. Two alternatives of obtaining a stable mixture presented themselves; either a colloidal solution in which the coal particles are reduced to colloidal size and enter into colloidal solution with the liquid phase, or a solid suspension mixture in which no attempt is made at colloidal size but where some means of stabilising the supra-colloidal particles and preventing or delaying their separation is attempted. The first alternative provided the problem of reducing the coal to colloidal size by mechanical grinding. In this, the energy consumed was roughly proportional to the increase in surface area of the product and the power required went up rapidly with the degree of fineness. Thus, there was a definite practical economic limit to the dergee of fineness to be achieved commercially by mechanical means, which was usually regarded as being in the neighbourhood of 200 mesh. It therefore seemed unlikely that pure mechanical reduction would enable coal to be reduced to the requisite colloidal dimensions so that a stable coal-oil mixture could be obtained. Therefore, some non-mechanical process must be adopted. Coal could be reduced to particles of colloidal size by the process of peptisation, *i.e.*, the splitting apart of the coal particles. This could be accomplished by the physical action of certain solvents, such as pyridine, but the practical possibilities from the commercial standpoint, largely depended on the ability to recover the solvents used, as those known at present were extremely high in cost in comparison with the fuels. Nevertheless, it seemed that this was a direction which research should take.

Supra-Colloidal Particles

The alternative oil-coal fuel to a true colloidal solution consisted of a solid suspension mixture and necessitated treating the mixture in such a way as to prevent or retard settlement of the supra-colloidal particles for a sufficient length of time for practical purposes. Various methods of achieving the stability of the supra-coloidal particles had been tried, for instance, by the introduction of stabilising agents, such as certain soap solutions, but there were many other compounds which had the same effect, and here again was a most important field of reserch. Alternatively to the use of stabilising substances, was the possibility of obtaining stability by the formation of dilute gels of sufficient rigidity to retain supra-colloidal particles in permanent suspension, but which at the same time would not be too stiff to be easily handled. Such gels, however, were very susceptible to the action of heat and became liquified as the temperature rose. This, therefore, provided a third line of research into this problem.

Mr. G. W. E. GIBSON suggested that, with a suitable oil, a "fixateur" might be found unnecessary. At the same time, the oil must be of a cheap grade otherwise the cost of the final fuel would be prohibited. Although one of the papers suggested that soap used as a "fixateur" caused trouble in pumping, that did not appear to have been the case in the "Scythia" test. Whether it would ever pay, for purely commercial purposes, to use coal of poor quality, was a debatable point.

No Prospects for Low Grade Coals

Dr. R. LESSING emphasised the point that no headway is likely to be made with these fuels if low grade coals are used. Too much has been made at various times of the point that any "muck" could be put through the grinding process, and if this attitude of mind was persisted in the whole progress of oil-coal fuels would be serious impeded.

Captain W. H. CADMAN paid a tribute to the work of the Fuel Research Board officials at the Fuel Research Station in regard to these fuels which showed that coal ground to dimensions considerably larger than colloidal dimensions can definitely be held in suspension as long as the oil can be maintained in a gel condition. This, of course, was related to temperature and raised the question of how long these oil-coal mixtures could be maintained in a stable condition especially for marine purposes. He gathered that it was necessary both in the Admiralty and the Mercantile Marine that such mixtures should remain stable for at least six months, although such a period would not apply under ordinary industrial conditions. He knew from experience, however, that reasonably stable colloidal fuels of this nature were obtainable to-day by the addition of stabilisers of the soap type, although amongst the best peptisers that he had seen was a creosote fraction. It might be that the addition of £1 per ton tax on imported oil would make this proposition less attractive than formerly, but that would probably be off-set by improved methods of grinding the coal. Hitherto we had talked of 85 per cent. passing through a 200 mesh and said nothing about the other 15 per cent.

An Extremely Important Point

Mr. W. A. WOODROW challenged the suggestion often made that the calorific value of a mixture of oil and coal is higher than the calorific value of either of the two constituents individually. Obviously the calorific value must be more or less an average of the two.

Eng.-Commander FUJII (Japan) called attention to the difficulties likely to be encountered when an oil-coal mixture having a certain stability is added to the remains in the bunkers of another oil-coal mixture having a certain difference in its characteristics, as was bound to happen with a vessel moving from one part of the world to another. There was also, he said, the influence of the temperatures in different parts of the world affecting these mixtures when used for marine purposes.

Dr. LESSING said the first point raised by Commander Fujii was an extremely important one and he did not remember it having been mentioned before. It was obvious that there would always be some residue left in ships' bunkers and the next batch of fuel, when obtained in another part of the world, was not likely to have precisely the same characteristics. That certainly was a matter for investigation.

Another speaker commented on the fact that the "Scythia" experiment had not been repeated and suggested that for that reason it must be assumed the experiment was not a success either technically or commercially.

Captain CADMAN said the position with regard to the "Scythia" experiment was that the Cunard Company had placed the whole of the information at its disposal in the hands of the British Government and the experiments were being continued at the Fuel Research Station in collaboration with the Cunard Company's technical experts and advisers.

Chemical Industry Lawn Tennis Tournament

Arrangements for the Final Matches

ARRANGEMENTS have been completed this week for the final matches in the third annual Chemical Industry Lawn Tennis Tournament, arranged by THE CHEMICAL AGE. By the kind invitation of Johnson, Matthey and Co., Ltd., Hatton Garden, the matches are to be played at that company's courts at the Toll Gate, College Road, Dulwich, on the afternoon of Saturday, September 16. In previous years the tournament has been confined to men's doubles, but this year it includes men's singles. THE CHEMICAL AGE silver challenge doubles cup, which was won in 1931 by S. Newman and E. J. Lawrence (" Industrial Chemist ") and in 1932 by S. E. Chaloner and W. Speakman (Monsanto Chemical Works, Ltd., Ruabon) will be presented to the winners of the doubles, to be held joindy for one year, and a handsome new trophy, THE CHEMICAL AGE silver challenge singles cup, will be presented to the winner of the singles for one year. In addition there are six excellent cups to be won outright. Three " Invicta " cups, presented by Thomas Hill-Jones, Ltd., will be awarded to the two winners of the doubles and the winner of the singles respectively, while three " Lloyd-Willey " cups of similar pattern will be given to the two runners-up in the doubles and the runner-up in the singles. All these cups are of solid silver, and the generosity of the donors is highly appreciated.

The third round matches were due to be completed on Monday last, but owing to holiday interruptions three of the matches had to be postponed until this week-end. The three matches still to be played in the third round are as follows:

SINGLES.

George, R. J. Crosfield & Sons, Ltd., Bank Quay, Warrington. (Warrington 800.)	*v*	**Blow, D.** The British Drug Houses, Ltd. Graham Street, City Road, London N.1. (Clerkenwell 3000.)
Pennington, R. C. J. Crosfield & Sons, Ltd., Bank Quay, Warrington. (Warrington 800.)	*v*	**Collins, A.** British Oxygen Co., Ltd., Ange Road, Edmonton, Londcn. (Tottenham 2647.)

DOUBLES.

Grape, L. F., & **Childs, A. F.** Borax Consolidated, Ltd., 16, Eastcheap, London. (Royal 1450.)	*v*	**Pennington, R. C.** & **George, R.** J. Crosfield & Sons, Ltd., Bank Quay, Warrington. (Warrington 800.)

Third Round Results

Third round results to date are as follows:

SINGLES.

C. G. Copp (Doulton and Co., Ltd.) beat L. Giltrow (Wliliams (Hounslow) Ltd.), 6—3, 4—6, 6—3.

L. F. Grape (Borax Consolidated, Ltd.) beat W. L. Alldis (Brandhurst Co., Ltd.), 8—6, 3—6, 6—3.

DOUBLES.

L. Giltrow and G. F. Hammond (Williams (Hounslow) Ltd.) beat J. W. Urban and H. Barningham (Monsanto Chemical Works, Ltd.), 6—4, 1—6, 6—1.

W. L. Alldis and S. B. Perridge (Brandhurst Co., Ltd.) beat R. F. Porter and R. S. Law (Howards and Sons, Ltd.), 6—0, 3—6, 6—2.

J. Haines and F. G. Hawley (Anglo-Persian Oil C., Ltd.) beat P. J. Prosser (John Haig and Co., Ltd.) and A. Baxter (United Yeast Co., Ltd.), 7—5, 7—5.

Semi-Final Draw

In anticipation of the remaining third round matches being payed to-day (Saturday), the draw for the semi-final matches has been made this week as follows:

SINGLES.

Copp, C. G. Doulton & Co., Ltd., 28, High Street, Lambeth, London, S.E.1. (Reliance 1241.)	*v*	**Grape, L. F.** Borax Consolidated, Ltd., 16, Eastcheap, London, E.C. (Royal 1450.)
George, R. J. Crosfield & Sons, Ltd., Bank Quay, Warrington. or **Blow, D.,** The British Drug Houses, Ltd., Graham Street, City Road, London, N.1	*v*	**Pennington, R. C.** J. Crosfield & Sons, Ltd., Bank Quay, Warrington or **Collins, A.,** British Oxygen Co., Ltd., Angel Road, Edmonton, London.

DOUBLES.

Giltrow, L., & **Hammond, G. F.** Williams (Hounslow), Ltd., Hounslow. (Hounslow 2929.)	*v*	**Grape, L. F.,** & **Childs, A. F.** Borax Consolidated, Ltd., 16, Eastcheap, London (Royal 1450), or **Pennington, R. C.,** & **George, R.,** J. Crosfield & Sons, Ltd., Bank Quay, Warrington (Warrington 800).
Alldis, W. L., & **Perridge, S. B.** Brandhurst Co., Ltd., Vintry House, Queen Street Place, London, E.C.4. (Central 1411.)	*v*	**Haines, J.,** & **Hawley, F. G.** Anglo-Persian Oil Co., Britannic House, Finsbury Circus, London, E.C.2. (National 1212.)

All semi-final matches must be played by **Monday, August 21,** and the results, signed by all players (winners and losers) must be forwarded to reach the Editor of THE CHEMICAL AGE not later than 9.30 a.m. on Tuesday, August 22. A summary of the rules, so far as they govern the third round of the tournament, is reproduced.

Summary of Rules

The competition shall be conducted on the knock-out principle, and the best of three advantage sets shall be played in all matches, except in the Final of the Singles, when the best of five sets shall be played.

The Editor of THE CHEMICAL AGE shall have the right to scratch any players who fail to play off their matches by the stipulated dates, or who otherwise fail to conform with the rules and regulations governing this competition.

Except in the case of the special period set apart for the final stages of the competition, players drawn against each other must make their own arrangements for playing off their match on a court mutually agreed upon. In the event of disagreement, the first name drawn shall have the right to choose the ground.

The result of each match must be sent by the winners to the Editor of THE CHEMICAL AGE, signed by all players (winners and losers) immediately after the match, and must reach the office of THE CHEMICAL AGE not later than by the first post on the day following the final day for playing off the round.

If any player be not present at the agreed place or time of the match, opponents shall be entitled to a walk-over, after having allowed reasonable time (say, a maximum of one hour) for the others' appearance. If the players find it impossible to play off their match on the day originally chosen, they must play it on any other day, to which both sides agree, within the stipulated period.

Any dispute arising between players, or otherwise, shall be referred to the arbitration of the Editor of THE CHEMICAL AGE, whose decision shall be final.

Giltrow and Hammond, who have defeated Urban and Barningham in the third round, were runners-up in the final last year, while Urban and his partner (Barningham has taken the place of F. S. Mortimer this year) were beaten in the 1932 semi-final by the winners of the cup (Chaloner and Speakman, of the Monsanto Chemical Works, Ltd., Ruabon). Alldis and Perridge reached the third round in 1932, and were in the semi-final in 1931. Haines and Hawley are new comers to the tournament this year, and have not lost a set so far, their total games score to date being 38—17. Copp, who is drawn against Grape in the semi-final of the singles this year, was in the doubles semi-final last year against Giltrow and Hammond.

German Potash Exports

A STEADY decline in exports of German potash was recorded for the first quarter of this year with an increase during April. Total exports for the first three months of 1933 were 126,673 metric tons—27 per cent. under the level for the corresponding period of 1932. Against the heavy loss in exports, German domestic sales of potash fertilisers expanded remarkably this year, rising by over 15 per cent. to 400,000 metric tons of pure potash (K_2O) in the first four months, from 351,000 tons in the corresponding period of 1932, and transcending even the level of 396,000 in the first four months of 1931. The favourable showing in the domestic trade this spring is the more striking since the closing months of last year has already recorded a marked improvement in demand.

The New Chemical Merger

Annual Meeting of Chemical and Metallurgical Corporation

DR. E. P. ANDREAE, the chairman of the Chemical and Metallurgical Corporation, Ltd., left no doubt in the minds of his audience at the annual meeting held in London, on July 31, as to the wisdom of accepting the offer to purchase made by Imperial Chemical Industries, Ltd. On technical grounds alone the corporation could have viewed the future with some confidence, but, as Dr. Andreae pointed out, lack of capital would have presented some serious difficulty, particularly as the corporation's guarantors have intimated that they are not prepared to increase their participation. The negotiations with the I.C.I. have been conducted with a view to securing shareholders an offer bearing adequate relation to the prospects of the corporation, and the terms of the offer appear to satisfy this criterion. Dr. Andreae pointed out that the I.C.I. reserve the right to withdraw the offer if it is not accepted on or before August 24 next by the holders of 90 per cent. in value of the three classes of shareholders affected, but up to August 1 the assents received totalled 70 per cent. of the number required.

Adverse Conditions of 1932

In the course of his speech, Dr. Andreae pointed out that the balance sheet showed the financial position of the corporation as at December 31, 1932. The trading profit for the year was £24,205. The year 1932, however, was a disappointing one. It began with a satisfactory revival of business, and had this continued the corporation should have been able to show a much stronger position. The balance sheet was "cleaned up" by a revaluation of the assets and a commensurate reduction of capital. Any improvement in the chemical trade so far as it affected the corporation's particular manufactures would therefore have been shown at once. Unfortunately, however, in May a sharp reaction was experienced in the demand for the corporation's products. No real recovery took place throughout the year, the demand remaining irregular and disappointing. Such conditions were reflected in a further fall of prices, particularly in the case of sulphate of ammonia. Although the actual tonnage of manufactured goods sold during the year was reduced by only 3 per cent. as against the previous year, the money value realised was less by £32,000.

"I feel," said Dr. Andreae, "that I should, particularly under these circumstances, give you some indication of what the position of this corporation would be if the offer were not accepted by the requisite majority. There is no doubt we could continue to carry on and would be ready to benefit immediately from any revival in trade, and yet it must be clear to an observing shareholder that even under much improved circumstances we should have a long row to hoe before we could count ourselves financially strong and independent. Our plant is good. Our organisation is good, and we have made a good name for ourselves in the market. On the other hand, looking farther ahead, although we have plenty of ideas for new developments which we believe could profitably be undertaken by our organisation in order to widen its scope, we are seriously hampered by lack of the capital necessary to bring them to reasonably early fruition."

Terms of I.C.I. Offer

The terms of the offer which the board of the Chemical and Metallurgical Corporation ultimately agreed to accept for themselves and to recommend to shareholders for acceptance may be summarised as follows:—For every ten fully paid 8 per cent. participating preferences shares of £1 each in the Corporation the I.C.I. will allot eight fully paid I.C.I. ordinary shares of £1 each. Taking the approximate market price to-day, say 30s. for the I.C.I. ordinary shares, the offer is equivalent to 24s. for each preference share. For every 50 fully paid ordinary shares of 2s. each in the Corporation apart from the fractions which have to be dealt with by a cash payment the I.C.I. will allot four fully paid I.C.I. ordinary shares of £1 each. At to-day's market price this is equivalent to 2s. 5d. for each ordinary share in the Corporation. In addition it is important to note that the shares offered by I.C.I. will rank for dividend as from January 1 of this year. For each option certificate carrying one ordinary share of the Corporation at par I.C.I. will pay 1½d. in cash.

The report and accounts were unanimously adopted.

The Institution of Gas Engineers

Results of 1933 Examinations

THE examination results of the Institution of Gas Engineers and the report of the board of examiners for 1933 have just been issued. The number of candidates examined has increased from 60 in 1924 to 412 in 1933. Of this year's candidates, fifteen passed with distinction, 129 gained first class certificates, 172 gained second class certificates and 96 failed. An increasing number of students are entering the gas industry from the Universities and public schools and are qualifying as chartered gas engineers, with a view to occupying technical positions on the manfacturing or distributing sides of the industry, which has increased its output of gas by 45 per cent. since the war. The examinations took place at the technical colleges throughout the British Isles on April 29 and May 6, 1933.

Of imporance are the diploma and higher grade certificates in gas engineering, which—under the Royal Charter—are amongst the qualifications necessary for membership or associate membership of the Institution; and the higher grade certificates in gas supply, one of which is required, *inter alia*, for election to associateship.

The examiners, in their report, state that the 1933 examinations emphasised the advantage which a sound general education gives to those who desire to specialise in technical subjects. Clarity of expression and sketching are two matters which should be given more attention by candidates. In many cases candidates did not apply the knowledge gained in the study of ancillary subjects when answering questions in the main subjects of gas engineering and gas supply. Whilst candidates generally displayed an improved knowledge of the engineering side of the gas engineering syllabus, there was a tendency to neglect the chemical side. In gas supply there was evidence from the answers that a lack of knowledge of chemistry and physics limits a candidate's ability to deal with the modern problems of gas distribution and utilisation.

In the examination for the higher grade certificate in gas engineering, the work submitted by internal and external candidates disclosed a fair knowledge of gas testing, purification, retort house governors, calorimetry, and the manufacture of sulphate of ammonia. It is evident that the question of coals is still receiving insufficient attention, and the methods of testing with which candidates appeared to be familiar are out-or-date. Most of the candidates had a good knowledge of routine and process working and testing, but the underlying principles were only vaguely appreciated.

In the examination for the diploma in gas engineering (manufacture) the work generally did not reach the standard required. Benzol extraction appeared to be well understood, and it is obvious that candidates continue to take a keen interest in the technical Press. Arithmetical working was not good, and answers frequently were not clear.

CHINESE imports of sodium sulphide increased in 1932 to 6,440 metric tons from about 5,100 tons in the preceding year. There is no local production of sodium sulphide in China and the requirements for some of the major uses such as textile printing, dyeing and tanning are apparently increasing.

Chemical Manufacturers and the Ottawa Pacts

No Protests to Canadian Tariff Board

MR. J. DAVIDSON PRATT, general manager and secretary of the Association of British Chemical Manufacturers, who has lately returned from a further business visit to Canada, stated in an interview at Montreal, on the eve of his return, that the British chemical industry was so well satisfied with the preferences it received at the Imperial Conference at Ottawa last year that it was not intended to bring up a single case before the newly-formed Canadian Tariff Board. What few changes are desired are minor adjustments, which it is hoped to obtain through negotiation with Canadian manufacturers and consumers.

Actually Britain's chemical trade with the Dominion has not increased by very much since the signing of the Ottawa pacts, but this is not due so much to lack of sufficient preferences as to the difficulties placed in the way of business by fluctuating exchanges.

In Mr. Pratt's opinion British chemical firms are not asleep to their opportunity in Canada. Within recent months there have been no less than five directors of British companies over there, making trade contracts and surveying the situation. The only other factor that has kept our firms from sending over large quantities of their products is that up to the present there has been no list available of the chemicals manufactured in the Dominion, and our people were reluctant to take the chance.

On the average, Canadian-made chemical materials are protected by a tariff of about 15 per cent. against similar products which enter from Britain. Those not manufactured in Canada are permitted to enter duty-free from Britain, while heavy duties are levied against the same chemicals entering from the United States or other countries.

The Canadian Tariff Commission

There has been criticism in some quarters of Britain's manufacturing world about the slowness with which the Canadian Tariff Commission has been formed, according to Mr. Pratt. But this criticism, he made it clear, has not come from the chemical industry, but from those who are a bit short-sighted. They know that they have lost business in Canada, and want to go about regaining it right away. They forget that it takes time to pick men of judicial calibre to sit on the board, and that it takes time to establish the basic principle under which the board will act.

It will probably take a long time for the Tariff Board to make its first inquiry, and its first decision. Under the terms of the Ottawa Agreement the Board is to see to it that British goods are to be admitted in such fashion that they have a fair chance of competition with the Canadian. That means that a large number of factors have to be studied. The Board has to decide whether it will consider wage rates only, or also capital charges and overheads as among the factors making up the cost of production. It will have to decide exactly what information is necessary.

Mr. Pratt said that a point of view stressed particularly by British industry was that you cannot sell unless you buy. That ought to be the first consideration. America tried to sell only and never buy and anyone could see what trouble the world had got into as a result.

Mr. Pratt, who also visited Washington, had something to say about the new Roosevelt Industrial Recovery Act. "It has tremendous possibilities for both Britain and Canada," he said. "The Act proposes to limit the hours of labour to 40 a week. That, of course, should raise the prices of American manufactured commodities. In turn, higher prices should make it easier for both you and us to sell our products in the United States. But then, again, United States industry might say that if the interior prices rise, it will be necessary to have still higher tariffs. The situation needs study."

An Economical Working Day

Every sympathy was expressed by Mr. Pratt toward the aim of President Roosevelt to reduce the hours of labour.

"After all," he said, "the one commodity of which you cannot have enough is leisure. A short time ago Lord Melchett proposed a scheme which may well be what Roosevelt eventually will arrive at. He suggested that there may be an economical working day beyond which it is not wise to reduce hours.

"But this solution was that the workman's leisure be saved up for him, and given out in lumps, as it were. That every year he should have a full month's holiday on full pay. Perhaps two months, and that he can use this time for the improvement of his health and mind, or perhaps to the lowering of his golf handicap. If, and when, American industry is properly organised, this sort or thing should be possible in the United States."

Cresols in Solidified Form

Extension of Patent

IN the Chancery Division, on July 29, Mr. Justice Luxmore had before him an application by Carl Adolf, of Vicorente, and the Solidol Chemical, Ltd., of Disney Street, Boro., S.E., for an extension of Patent No. 118,667, for an antiseptic and disinfectant known as Lysolate (Lysol Tablets). The patent related to a method of preparing cresol, and mixtures of cresols in solid form. The patent expired in September, 1933 and applicants sought an extension on the ground of its public utility.

Mr. Jacobs appeared for the applicants and Mr. Heald represented the Comptroller of Patents.

Dr. W. J. Burns gave evidence as to the public utility of the tablets, as antiseptics. The benefit of Lysolate was that they dissolved quickly in cold water when time was an urgent matter. The solidified form of cresol was of great service to surgery.

His Lordship granted an extension for the patent for five years.

"This Soft Age"

Sir Ernest Benn's New Book

"THIS Soft Age," which is to be published on September 15, follows at an interval of eighteen months on Sir Ernest Benn's last success, "Honest Doubt." "This Soft Age" is a ruthless attack upon the post-war generation, and the reputation of the author in the matter of attack need leave no doubt as to its vigour. It marks a new departure on the part of Sir Ernest Benn in that for the first time in all his writings he adopts the role of the optimist. The new theory, to which he gives the name of the thirty-fifty man, is likely to attract attention, not only from population and statistical experts, but from the public at large. The year 1933 is the first post-war year in which the population contains a proportion of men of thirty who are completely free from the deterioration suffered by those who went through the 1914 1918 period. From this year onwards the population will slowly recover its normal proportion of health, war-free men, and on this fact Sir Ernest builds hopes which he has never been able to find in political endeavour or even world conferences.

Fertilisers for Wattles

A New Market for Superphosphate

A CO-OPERATIVE organisation in Natal has been carrying out a series of experiments on the fertilisation of wattles, and it has been shown that money invested in 200 lb. to 400 lb. superphosphate per acre should double itself in eight years, and in some cases triple itself. Phosphatic fertilisers have given the most reliable and satisfactory response, and in all experiments superphosphate has proved itself the best and most consistent. The applications of fertiliser on these test plots varied from 200 lb to 1,000 lb. per acre, but after careful investigation it was considered that the most economic dressing was from 200 lb. to 400 lb. per acre. Fertilised trees have in most cases proved to be more resistant to the bag-worm, which is at present the cause of considerable trouble in the Natal wattle areas, and they are also more rapid in recovering from defoliation.

News from the Allied Industries

Non-Ferrous Metals

A FURTHER SUBSTANTIAL REDUCTION in the supplies of tin is recorded, although the statistics for the past month are not quite as favourable as the market anticipated. Total visible supplies at the end of July were estimated at 37,690 tons, which is 1,970 tons less than the total reported a month earlier. Deliveries increased from 9,413 tons reported for the previous month to 10,162 tons. Consumption in America is rapidly expanding. This is of the greatest importance to the mining industry, as America is easily the largest user of the metal. A revival in the motor-car manufacturing and tin-plate industries in that country, therefore, will bring about a speedy reduction of available supplies if output is kept at its present level.

Paper

THE ZELLSTOFF-FABRIK, Mannheim, Germany's chief cellulose and paper manufacturing concern, has closed its financial year 1932 with a new loss of 4,330,000 marks, which is to be carried forward to the new account, although the company had already adopted a measure of financial reorganisation in the preceding year. Following upon the reduction in its share capital from 45,500,000 marks to roughly 40,000,000 marks in 1931, the share capital is again to be reduced by the cancellation of 2,000,000 marks of ordinary shares and 210,000 marks of preference shares, Series A, to 37,800,000 marks, from which 5,720,000 marks of management shares, reserved for the shareholders and bondholders of its subsidiary undertaking at Kexholm, in Finland, must be deducted in addition.

Iron and Steel

FOR THE FIRST SIX MONTHS of this year the orders secured by the English Steel Corporation, Ltd., whose headquarters are at Vickers Works, Sheffield, have been £271,000 more than those obtained during the first half of 1932. This was disclosed at the employee's gala at Sheffield on July 8 by Commander C. W. Craven, managing director.

MR. RALPH SILLARS, chairman of Warner and Co., Ltd., manufacturers of special pig iron, presiding at the annual meeting of the company at Middlesbrough, on August 1, announced that the firm was about to make important additions to its plant, which the directors were confident would materially improve their position. He also stated that he was retiring from the position of joint managing director at the end of this month, after an association with the company for 52 years. He has been chairman for thirteen years, and will continue to hold that position.

IT IS OFFICIALLY ANNOUNCED that resolutions in favour of the scheme of arrangement and the terms of amalgamation with the South Durham Steel and Iron Co., Ltd., were passed by the requisite majorities at meetings of the 5½ per cent. first mortgage redeemable debenture stockholders, the 6 per cent. cumulative preference shareholders and the ordinary shareholders of Dorman Long and Co., Ltd., held in London on July 27. The chairman of the meetings is making a full report to the Court. The result of the poll taken at the extraordinary general meeting was as follows:—In favour of the resolutions, 3,303,500 votes; against the resolution, 29,749 votes.

A PETITION FOR THE WINDING-UP of the Darlington Rustless Steel and Iron Co., Ltd., has been presented to the High Court by Mr. B. A. Holland, engineer, of 4 More's Gardens, Chelsea. The petition is to be heard at the Law Courts on October 9. The company was registered in September, 1930, with a capital of £100,000, to operate the Wild process of manufacture, named after Mr. Ronald Wild, of Sheffield, who perfected it. When operations began, the manufacture of rustless iron was a comparatively new enterprise in this country. It was anticipated that the plant at Darlington would turn out 700 to 1,000 tons of iron a month, and that 250 men would be employed. Darlington was selected as the centre of manufacture because of its cheap electricity, as the process of manufacture includes the use of an extensive supply of that form of power.

Beet Sugar

IT HAS BEEN ANNOUNCED in the House of Commons that the Government has decided, as a temporary measure, to introduce legislation next session providing for a subsidy on sugar and molasses manufactured from home-grown beet between September 30, 1934, when the present Subsidy Act expires, and October 1, 1935. The subsidy on sugar will be at the present rate of 6s. 6d. a cwt. In regard to molasses, no subsidy would be payable so long as the world price of raw sugar exceeded 6s. a cwt., but a subsidy at a rate equivalent to 1½d. a cwt. on sugar will be payable for each penny by which the price of sugar was less than 6s. until the present maximum subsidy on molasses of 9s. a cwt. of sugar was reached. This decision was based on the understanding that the refining and beet-sugar manufacturing interests co-operated in submitting as soon as possible a marketing scheme under the Agricultural Marketing Act. Meanwhile it was the intention of the Government to take such steps as might be necessary and practicable to support existing growers in their efforts to improve their industry.

Rubber

A CONFERENCE OF REPRESENTATIVES of certain scientific bodies interested in the continuation of the Research Association of British Rubber Manufacturers took place in London on August 1. The meeting had been arranged to consider the position arising out of the Government's announcement not to proceed with the Rubber Industry Bill, the purpose of which was to impose a levy on the raw material in order that the work of the Association might be carried on without the cost falling on the taxpayers. The strongest possible pressure is to be exerted on the Government to find the necessary financial assistance, so that the work of the Association might continue. The working expenses of the organisation are estimated at £8,000. Of this the Government has promised to contribute £4,000 but it is to be asked to increase this sum to £6,000, the balance to be raised by the Association. Since the organisation was started in 1920, a sum of £100,000 has been raised for this research work. Of this sum the Government has given £40,000, the remaining £60,000 having been contributed by the industry.

Nitrate Prices

Position of Chilian Producers

FOLLOWING the breakdown of the conference in Paris between the Chilian nitrate producers and the synthetic producers it was stated on August 1 that the suggestion that a price "war" between Chilian nitrate producers and synthetic producers was threatened had caused annoyance. The main cause of the failure of the recent Paris negotiations was that Chile could not agree to the demands of their competitors that they should sell their product at much higher prices. This stipulation was said to have applied not only to the home markets of Continental manufacturers but also to other markets which must draw their supplies from overseas, and in which Chile had an equal standing with other producers. Chile had no wish or intention to provoke a price "war" on the contrary they desired to adopt a constructive policy.

THE second meeting of the International Fertiliser Application Committee was held in Berlin recently. The agenda included: Choice of uniform and appropriate methods for the determination of fertilisation needs in soil; nitrogenous fertilisation of winter wheat; intensive pasture fertilisation; influence of wheat fertilisation on the bread quality of flour; plant fertilisation for sickness control; and reports on the use of phosphatic, nitrogenous and potassium fertilisers in Europe. The number of reports on each subject varies from 23 for the first item to 2 to 4 on the minor items. Delegates participating in the conference included representatives from Germany, France, England, Italy, Czechoslovakia, Rumania, Poland, Switzerland, Spain, Hungary, Tunisia, India, and the United States.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE following market report is based on information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

PRICES on the London chemical market continue firm with quite a steady demand generally. Having regard to the time of the year business in chemical products on the Manchester market during the past week has been reasonably satisfactory, though the bulk of transactions consists of parcels for comparatively near delivery dates. Specifications against contracts entered into previously are said to be coming to hand in fairly good volume. One or two firms this week have expressed satisfaction with the weight of business booked during July, which, on the whole, has shown some measure of improvement compared with the same month in previous years. Business has been slightly better in the Scottish heavy chemical market with every likelihood of a general improvement during the coming week.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9¾d.

ACID, CRESYLIC.—97/99%, 1s. 1d. to 1s. 7d. per gal.; 98/100%, 1s. 5d. to 2s.

ACID, FORMIC.—LONDON: £47 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 7s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £48 to £54 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 11½d. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 11¾d. to 1s.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON. £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £32 per ton; powdered, £34, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £24 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £19 c.i.f. main U.K. ports for imported material; Cornish nominal, £23 f.o.r mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £23 10s. at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—2s. 9d. to 3s. 1d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3½d. to 4¾d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb. Liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 per cwt.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £36; brown, £1 per ton less. MANCHESTER: White, £32 10s.; brown, £30.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £24 to £26 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. per gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—9d. to 10d. per lb. nominal.

POTASH, CAUSTIC.—LONDON: £42; MANCHESTER: £41.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. crystals, 8¼d. MANCHESTER: Commercial, 8¼d. B.P., 8½d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8¼d. ex store. MANCHESTER: Yellow, 8½d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 5s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 15s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.
SODIUM CHROMATE.—3¾d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
SODIUM NITRITE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£12 10s. per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £17 per ton f.o.b.
SULPHUR.—£11 10s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 3d. to 4s. 5d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.
ZINC SULPHIDE.—11d. to 1s. per lb.

Pharmaceutical and Fine Chemicals

CADMIUM IODIDE.—14s. 6d. per lb.
IRON AMMON. CITRATE.—B.P., 1s. 9d. per lb.; green, 2s. 5d. per lb.
IRON QUININE CITRATE.—9¾d. to 1s. 0½d. per oz.
LINALOL (ex Shui oil).—5s. 9d. per lb.
LINALYL ACETATE.—Ex Bois de Rose, 7s. 6d. per lb.; ex Shui oil, 6s. 6d.
MENTHOL.—A.B.R. recryst., B.P., 15s. per lb.; synthetic detached crystals, 8s. 6d. to 10s. 6d. per lb.
PHENACETIN.—4s. to 4s. 6d. per lb.

Essential Oils

BOURBON GERANIUM.—24s. 9d. per lb.
CAMPHOR, BROWN.—70s. per cwt.
CAMPHOR, WHITE.—75s. per cwt.
EUCALYPTUS.—Australian B.P. 70/75%, 1s. 2d. per lb.
LEMON.—4s. 6d. per lb.
LEMONGRASS.—3s. 5d. per lb.
ORANGE, SWEET.—6s. 6d. per lb.
PALMA ROSA.—8s. per lb.
PEPPERMINT.—Wayne County, 14s. 3d. per lb.
PETITGRAIN.—4s. 9d. per lb.

Intermediates and Dyes

IN the following list of intermediates delivered prices include packages except where otherwise stated:—
ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
p-CRESOL 34-5° C.—1s. 9d. per lb. in ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
DICHLORANILINE.—2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROTOLUENE.—48/50° C., 8d. per lb.; 66/68° C. 8¾d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 15s. in casks, in 1-ton lots.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 4d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 10d. per lb.; crude, 60's, 2s. 5d. to 2s. 6d. per gal.; 2% water 3s. 0¾d. MANCHESTER: Crystals, 9¼d. per lb.; crude, 2s. 8d. per gal. SCOTLAND: 60's, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100%, 11d. to 1s. 8d. per gal.; pale, 98%, 1s. 4d. to 1s. 5d.; pale 95%, 11d. to 11½d.; dark, 10d., all according to specification; refined, 1s. 8d. to 1s. 9d. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark, 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
ANTHRACENE OIL.—Strained, 4½d. per gal.
BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor 1s. 4d. to 1s. 4½d.; 90%, 1s. 5d. to 1s. 6d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.
CREOSOTE.—B.S.I. Specification standard, 3d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 2½d. to 3½d. SCOTLAND: Specification oils, 3½d. to 4d.; washed oil, 3½d. to 4d.; light, 3d. to 3½d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent, 90/160%, 1s. 4d. to 1s. 5d. per gal.; 95/160%, 1s. 7d.; 90/190%, 9d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaked, £10 per ton. Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.
PITCH.—Medium soft, £4 per ton. MANCHESTER: £4 f.o.b. LONDON: £3 15s. f.o.b. East Coast port.
PYRIDINE.—90/140, 4s. to 4s. 6d. per gal.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160% 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND: 4d. per gal.
TOLUOL.—90%, 2s. 2d. to 2s. 3d.
XYLOL.—Commercial, 2s. to 2s. 1d. per gal.; pure, 2s. 3d. to 2s. 4d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9 per ton. Grey £14 to £15. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £9 10s.; grey, £16.
ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 to £11 per ton.
WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 7d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—£6 15s. per ton, delivered in 6-ton lots to consumer's nearest station.
NITRATE OF SODA.—£8 16s. per ton delivered in 6-ton lots to consumer's nearest station.
CYANAMIDE.—£7 per ton for July/August delivery carriage paid to any railway station in Great Britain in lots of 4 tons and over.
NITRO-CHALK.—£7 5s. per ton delivered in 6-ton lots to consumer's nearest station.
CONCENTRATED COMPLETE FERTILISERS.—£10 9s. 6d. to £11 per ton according to percentage of constituents.

Latest Oil Prices

LONDON, August 2.—LINSEED OIL was barely steady. Spot, small quantities, £24; Aug., £21; Sept.-Dec., £21 2s. 6d.; Jan.-April, £22, naked. RAPE OIL was dull. Crude, extracted, £28 10s.; technical refined, £30, naked, ex wharf. COTTONSEED was quiet. Crude, extracted, £21 10s.; refined common edible, £24 5s.; deodorised, £26 5s., naked ex mill. TURPENTINE was easier. American, 49s. per cwt.
HULL.—LINSEED OIL.—Spot quoted £21 12s. 6d. per ton; Aug., £21 2s. 6d.; Sept.-Dec., £21 5s.; Jan.-April, £22 2s. 6d. COTTON OIL.—Egyptian crude, spot, £22; edible refined, spot, £23 15s.; technical spot, £23 15s.; deodorised, £25 15s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £18, naked. GROUNDNUT OIL.—Extracted, spot, £25; deodorised, £29. RAPE OIL.—Extracted, spot, £27 10s.; refined, £29. SOYA OIL.—Extracted, spot, £21; deodorised, £24 per ton. COD OIL, 21s. per cwt., nominal. CASTOR OIL.—Pharmaceutical, spot, 39s.; first, 34s.; second, 31s. per cwt. TURPENTINE, American, spot, 51s. 6d. per cwt.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

MANUFACTURE OF A POLYMERISATION PRODUCT AND OF MOULDED BODIES THEREFROM.—Imperial Chemical Industries, Ltd., and R. Hill. Nov. 17, 1931. 395,687.

VULCANISATION OF RUBBER.—Imperial Chemical Industries, Ltd., M. Jones and W. J. S. Naunton. Jan. 18, 1932. 395,705.

MANUFACTURE OF ORGANIC DISULPHIDES.—Imperial Chemical Industries, Ltd., H. M. Bunbury, J. S. H. Davies and A. Eccles. Jan. 21, 1932. 395,726.

MANUFACTURE OF DIPHENYLOLPROPANE.—Imperial Chemical Industries, Ltd., and R. Greenhalgh. Jan. 21, 1932. 395,732.

ROASTING OF PLUMBIFEROUS SULPHIDE ORES.—K. W. Young and Imperial Chemical Industries, Ltd. Jan. 23, 1932. 395,760.

MANUFACTURE OF HYDROCYANIC ACID GAS, PARTICULARLY FOR USE AS A FUMIGANT OR THE LIKE.—A. Standen, T. Ewan, and Imperial Chemical Industries, Ltd. Jan. 23, 1932. 395,761.

PREPARATION OF SOFT RUBBER.—Rubber Growers' Association, Inc., and G. Martin. Feb. 3, 1932. 395,774.

PREPARATION OF UNVULCANISED INDIARUBBER IN CRUMB OR POWDER FORM.—Rubber Growers' Association, Inc., and G. Martin. Feb. 3, 1932. 395,775.

MANUFACTURE AND PRODUCTION OF AZO DYESTUFFS.—J. Y. Johnson (I. G. Farbenindustrie). April 1, 1932. 395,820.

MANUFACTURE OF MONOAZO DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie). April 25, 1932. 395,832.

MANUFACTURE OF PHOSPHORUS.—Victor Chemical Works. July 8, 1931. 395,844.

PRODUCING OF IMPREGNATING BATHS AND PRINTING COLOURS CONTAINING ARYLIDES OF 2.3 OXYNAPHTHOIC ACID.—H. T. Böhme Akt.-Ges. July 9, 1931. 395,853.

MANUFACTURE OF PHOSPHORUS.—Victor Chemical Works. July 11, 1931. 395,865.

MANUFACTURE OF MOULDING SUBSTANCE.—International General Electric Co., Inc. July 28, 1931. 395,880.

SIMULTANEOUS PRODUCTION, FROM METHANE, OF HYDROGEN, LAMP BLACK, AND LIGHT, LIQUID HYDROCARBONS.—Dr. C. Padovani. Sept. 19, 1931. 395,893.

PRODUCTION OF ARTIFICIAL RESINS FROM POLYHYDRIC ALCOHOLS AND POLYBASIC ACIDS.—R. Weithöner and Glasuritwerke M. Winkelmann Akt.-Ges. Sept. 14, 1932. 395,894.

POLYHYDRIC ALCOHOL-POLYBASIC ACID RESINS.—American Cyanamid Co., and T. F. Bradley. Sept. 24, 1932. 395,899.

MANUFACTURE OF AZO DYESTUFFS.—Durand and Huguenin Akt.-Ges. Jan. 14, 1932. 395,951.

MANUFACTURE AND PRODUCTION OF COMPLEX METAL COMPOUNDS OF ORTHOHYDROXYAZO DYESTUFFS.—I. G. Farbenindustrie. May 10, 1932. 395,968.

PROCESS OF PRODUCING SOLID PREPARATIONS OF LACTIC ACID.—F. A. V. Klopfer. Feb. 27, 1933. 395,990.

MANUFACTURE OF 3-OXYSELENONAPHTHENE AND ITS DERIVATIVES.—I. G. Farbenindustrie. April 27, 1932. 396,011.

Applications for Patents

MANUFACTURE OF PREPARATIONS FOR COMBATING ANIMAL PESTS.—I. G. Farbenindustrie. July 19. (Germany, July 22, '32.) 20406.

PHOTOGRAPHIC BLEACHING-OUT LAYERS.—I. G. Farbenindustrie. July 21. (Germany, July 21, '32.) 20605.

MANUFACTURE OF VAT DYESTUFF PREPARATIONS IN POWDER FORM.—I. G. Farbenindustrie. July 21. (Germany, July 23, '32.) 20641.

MANUFACTURE OF ISOTHIOCYANATE SULPHONIC ACIDS.—I. G. Farbenindustrie. July 22. (Germany, July 23, '32.) 20727.

MANUFACTURE AND APPLICATION OF SECONDARY DISAZO DYES.—Imperial Chemical Industries, Ltd. July 18. 20252.

MANUFACTURE OF FERTILISERS.—J. Y. Johnson (I. G. Farbenindustrie). July 17. 20161.

MANUFACTURE OF LUBRICATING OILS.—J. Y. Johnson (I. G. Farbenindustrie). July 17. 20162.

MANUFACTURE OF APPLICATION OF SECONDARY DISAZO DYES.—A. H. Knight. July 18. 20252.

REFINED ETHERS OF POLYSACCHARIDES.—L. Lilienfeld. July 17. 20164.

CARBOHYDRATE DERIVATIVES.—L. Lilienfeld. July 17. 20165, 20168.

MAKING CARBOHYDRATE ETHERS.—L. Lilienfeld. July 17. 20166.

ETHANOL, MATERIALS CONTAINING ETHANOL, ETC.—L. Lilienfeld. July 17. 20169, 20170.

ELECTRICAL PRECIPITATION OF SUSPENDED PARTICLES FROM GASEOUS ETC., FLUIDS.—Lodge-Cottrell, Ltd. (Research Corporation of New York), and E. F. Repetto. July 18. 20237.

COMBINED NOZZLE AND SHUT-OFF VALVE FOR CORROSIVE LIQUIDS.—F. O. Monkhouse. July 18. 20308.

PORTABLE OXYGEN BREATHING APPARATUS.—C. V. Morris. July 17. 20117.

PURIFICATION OF BENZOL, PETROL, ETC.—Refiners, Ltd., and T. Scott. July 21. 20581.

MANUFACTURE OF CHROMIFEROUS DYESTUFFS.—Soc. of Chemical Industry in Basle. July 18. (Switzerland, July 19, '32.) 20280.

MANUFACTURE OF CHROMIFEROUS DYESTUFFS.—Soc. of Chemical Industry in Basle. July 19. (Switzerland, July 20, '32.) 20379.

MANUFACTURE OF CHROMIFEROUS DYESTUFFS.—Soc. of Chemical Industry in Basle. July 19. (Switzerland, July 22, '32.) 20380.

APPARATUS FOR PRODUCTION OF GASEOUS MIXTURE OF OIL AND LIQUID FUEL.—A. W. Southey. July 17. 20160.

MANUFACTURE OF CITRIC ACID.—Soc. Italiana per l'Industria dell' Acido Citrico et Affini. July 29. 21402.

PLANT FOR TREATING GRANULAR, ETC., MATERIAL.—Chemical Engineering and Wilton's Patent Furnace Co., Ltd. July 25. 20920.

MANUFACTURE OF CARDIO-ACTIVE MATERIALS FROM GLUCOSIDES OF DIGITALIS, ETC.—Chemical Works, formerly Sandoz. July 24. 20811.

TREATMENT OF AMMONIACAL LIQUOR CONTAINING PHENOLIC BODIES. C. Cooper. July 25. 20897.

PRODUCTION OF MAGNESIUM SULPHATE.—H. O. Dering. July 25. 20941.

MANUFACTURE OF ORGANIC SUBSTANCES.—H. Dreyfus. July 27. 21111.

MANUFACTURE OF COMPOSITIONS CONTAINING LACQUER BASES, ETC.—H. Dreyfus. July 28. 21222.

Complete Specifications Open to Public Inspection

FERTILISING SALTS.—H. Grah. Jan. 19, 1932. 402/33.

PROCESS FOR THE PRODUCTION OF NON-EMBRITTLING IRON AND STEEL.—Vereinigte Stahlwerke Akt.-Ges. Jan. 22, 1932. 493/22

PRESERVATION OF GREEN FODDER.—I. G. Farbenindustrie. Jan. 22, 1932. 984-990/33.

MANUFACTURE OF DYES AND INTERMEDIATES THEREFOR, AND PHOTOGRAPHIC EMULSIONS SENSITISED THEREWITH.—I. G. Farbenindustrie. Jan. 8, 1932. 1542/33.

MANUFACTURE OF WATER INSOLUBLE AZO DYESTUFFS ON THE FIBRE.—I. G. Farbenindustrie. Jan. 18, 1932. 1676/33.

PROCESS FOR THE PRODUCTION OF COMPOSITE FERTILISERS.—H. Kappen. Jan. 18, 1932. 1695-1699/33.

PROCESSES FOR THE PURIFICATION AND/OR STERILISATION OF SOLUTIONS AND OTHER LIQUIDS BY MEANS OF BASE EXCHANGERS.—Dr. G. Austerveil and C. Jean-Prost. Jan. 20, 1932. 1812/33.

MANUFACTURE OF CHROMIC HYDROXIDE AND ORGANIC OXIDATION PRODUCTS.—I. G. Farbenindustrie. Jan. 20, 1932. 1817/33.

COMPOSITION OF MATTER AND PROCESS OF PREPARING SAME.—Resinous Products and Chemical Co. Jan. 23, 1932. 19883/33.

DYEING ACETYL-CELLULOSE AND MIXED MATERIALS CONTAINING ACETYL-CELLULOSE.—J. R. Geigy Akt.-Ges. Jan. 8, 1932. 20606/33.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Italy.—An agent established at Milan wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of heavy chemicals, dried fish and leather. (Ref. No. 129.)

Roumania.—A reputable firm is desirous of representing British manufacturers and shippers of dyes and chemicals for textile and industrial purposes; oils, fats, waxes and resins. (Ref. No. 131.)

South Africa.—The British Trade Commissioner at Johannesburg reports that the South African Railways and Harbours Administration is calling for tenders (Tender No. 89), to be presented in South Africa by October 3, 1933, for the supply of disinfectant fluid which will be required during the period January 1 to December 31, 1934. (Ref. F.Y. 1820.)

South Africa.—The Senior Trade Commissioner in South Africa reports that the South African Railways and Harbours Administration is calling for tenders (Tender No. 88), to be presented in South Africa by September 25, 1933, for the supply of 10,635 gallons of raw linseed oil and 25,415 gallons of boiled linseed oil. (Ref. B.Y. 7627.)

From Week to Week

MR. PAT MURRAY, Swansea, Welsh representative for many years of the Vacuum Oil Co., has been appointed technical representative in London of the Texas Oil Co., Ltd.

WE REGRET TO ANNOUNCE THE DEATH of Mr. J. W. Ritchie, Alexandria, of the United Turkey Red Co. Prominent in public affairs he was vice-convener of Dumbarton County Council, and held various other public offices.

TUESDAY, August 1, was the twenty-first birthday of the Triplex Safety Glass Co. Safety glass is now a standard fitting on almost every motor car, and its use has been made compulsory by the Ministry of Transport on windscreens and on all facing forward windows of all road vehicles.

THE FRENCH DECREE modifying the tariff on American products will be ratified in the near future. The duty on cotton waste will, by the decree, be raised to 40 francs per 100 kilos. Potassium and sodium silicates remain at the former intermediary tariff.

A MEETING WAS HELD IN CARDIFF on July 31 by all sections of the coal industry to discuss the possibilities of erecting an oil producing plant on the South Wales coalfield. It was stated that South Wales coal was suitable for either process, hydrogenation or carbonisation. A general belief prevailed that sufficient capital could be found for such an enterprise.

AT THE FIRST MEETING of creditors of Harry Brierley, soap maker, of Gomersal, Yorkshire, held on July 28, at the Official Receiver's office, Bradford, a statement of affairs was submitted which showed ranking liabilities of £308 1s. 7d., with net assets of £3 10s., leaving a deficiency of £304 11s. 7d. Debtor attributed his failure to "bad trade, ill-health and changing business premises." The matter was left in the hands of the Official Receiver, as trustee.

GRADUATES IN CHEMISTRY at Armstrong College, Newcastle, are being appointed to positions in various parts of the country in quite considerable numbers. The latest to take up positions elsewhere are Dr. T. G. Pearson, who goes to the Imperial College, London, and Dr. G. R. Ramage, who has been appointed to a lecturership at the University College of North Wales, Bangor. Other recent appointments are those of Mr. C. R. Mavin and Dr. A. J. Rudge as research workers with Imperial Chemical Industries, Ltd.

IT IS REPORTED FROM MONTREAL that sufficient radium has now been produced at the Port Hope (Ontario) refinery of Eldorado Gold Mines, Ltd., to fill the initial order given by the Ontario Department of Health. The Mines branch laboratory crushed and ground the ore which came from the Great Bear Lake, but a crusher and rod mill have just been installed at the Port Hope plant, which has a present capacity of 10 grammes of pure radium per annum, representing at £10,000 per gramme a gross value of £100,000 and a nett return to the company of £66,000 per annum.

THE GOVERNING COUNCIL of the Indian Institute of Science, Bangalore, has decided to give a definite industrial bias to research work. All students at the Institute are to have facilities for workshop training and it is understood that the Institute will be able to manufacture at the workshop its own equipment. The Council have also approved of the opening of new courses in chemical engineering, sugar technology and communications engineering, and all steps to make these new departments most useful would be taken, so as to make them meet the general industrial requirements of the country.

IN THE HOUSE OF COMMONS last week, Mr. Kirkwood asked the First Lord of the Admiralty how much Scottish shale oil had been purchased for the Admiralty in the last three years; and whether it was intended to increase the purchases of shale oil for the Navy, in view of the Government's declared policy of encouraging the production of oil in this country from coal and shale. In replying, the Parliamentary Secretary to the Admiralty (Lord Stanley) said that the approximate totals of the various grades of Scottish shale oils purchased by the Admiralty during the financial years shown were: 207,500 gal. in 1930, 266,500 gal. in 1931, 225,500 gal. in 1932.

ON THE RECOMMENDATION of the Import Duties Advisory Committee, the Customs duty on glue and size, gelatine and osseine is increased as from August 3, 1933, to 10s. 6d. per cent., or 25 per cent. of the value of the goods, whichever is the greater. The Advisory Committee states that a substantial industry for the production of glue and size exists in this country, and that its maintenance by a more adequate duty against increasing importations at low prices is in the national interest, as it absorbs tannery waste and fish offal available at the fishing ports. The manufacture of gelatine from osseine has also been established here, and its expansion appears to the Committee desirable, particularly as stimulating the demand for certain heavy chemicals produced in this country.

THE NOMINAL CAPITAL of the Etna Chemical Co., Ltd., has been increased by the addition of £1,000 in £1 ordinary shares beyond the registered capital of £100.

RUSSIAN OIL PRODUCTS, LTD., London, have accepted a site on part of the ground belonging to the Ford works at Farina, Cork, on which they intend to erect a new factory. The matter has been referred to a committee of Cork Harbour Board.

THE DEATH TOOK PLACE recently of Walter Shewell Corder, aged 72, of Rosella Place, North Shields. He was associated with the firm of Williamson and Corder, Ltd., of North Shields, which was subsequently merged, with a number of other firms, into British Glues and Chemicals, Ltd.

DR. MAURICE STACEY, who with Professor W. N. Haworth has published several papers on the constitution of carbohydrates, has been awarded the Junior Beit Fellowship (£400 a year for three years). He is at present working under Professor Haworth as a research student at the University of Birmingham.

THE ERASMIC COMPANY, associated with Joseph Crosfield & Sons, Ltd., Warrington, for many years manufacturers of scented soap and perfumes, is to move shortly to Port Sunlight. It is intended to concentrate the manufacture of the company's products at the Lever factory at Port Sunlight. The men at Warrington are to be transferred to other departments and the female labour generally will go to Port Sunlight.

RECENT WILLS PROVED include the following:—William Middlemiss Lamont, of Herne Hill, London, manager of the Key Glass Works, Ltd., of New Cross, £14,440 (net personalty £10,103); William John Peter, of Par (Cornwall), and of Mitcham Common, London, governing director of Typke and King, Ltd., Crown Chemical Works, Mitcham Common, £12,791 (net personalty £9,408); Alfred James Osgerby, of Summerfield, Marine Drive, Bridlington, retired dry soap manufacturer, £18,181 (net personalty £14,977).

THE DIRECTORS OF BENN BROTHERS, LTD., publishers of THE CHEMICAL AGE and sixteen other trade and technical journals, recommend the payment of the following final dividends, less tax, for the year ended June 30: 3 per cent. on preference shares, which with the interim dividend of 3 per cent. paid in February makes 6 per cent. for the year; 8¾ per cent. on ordinary shares, which with the interim dividend of 6¼ per cent. paid in February makes 15 per cent. for the year; and 1s. 9d. per share on the deferred shares, which with the interim dividend of 1s. 3d. per share paid in February makes 3s. for the year.

THE FIRST PAINT FACTORY IN COLUMBIA was recently established under the name of Colombo-Alemana de Colores, S.A., Bogota. The stockholders are prominent Colombian business men and the management of the plant is under the supervision of a German engineer who made a survey of the country's resources of raw materials. At present pigments and black varnish are manufactured but ready-mixed paints, floor wax, waterproofings, fillers and boiler compounds will be added to the list of products upon receipt of additional plant machinery from Germany. Black varnish is now the largest item manufactured and is sold under the trade name "Cadecol."

THE BOARD OF TRADE has received complaints under Section 1 (5) of the Safeguarding of Industries Act, 1921, that insulin and its salts, carotene and sulphur, precipitated, B.P., have been improperly excluded from the List H (iii) of articles chargeable with duty under Part I of that Act, as amended by Section 10 of the Finance Act, 1926. The complaints will be referred for arbitration to a tribunal constituted under Section 10 (4) of the Finance Act, 1926, and the date of the hearing will be announced in due course. Any communications should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, George Street, London, S.W.1, not later than August 28.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE has accepted an invitation to hold its meeting in Aberdeen next year, and a large and representative public meeting called by Lord Provost H. Alexander and Principal Sir George Adam Smith to make arrangements for the Association's visit was held in the Town and County Hall, Aberdeen, recently. Lord Provost Alexander, who presided, said that almost half a century had elapsed since the Association last met in Aberdeen. Sir Frederick Gowland Hopkins, president of the Royal Society and of the British Association, said any interested person could become a member of the Association by paying its subscription, and the measures of the number who did so at any place of meeting was a measure of the success of that meeting. That statement was less grasping than perhaps it sounded, for the Association devoted all the money it could spare above its running costs to the assistance of scientific research by grants. Professor P. G. H. Boswell, the general secretary, spoke of the work of the Association.

Company News

Broken Hill South, Ltd.—The directors have declared a dividend of 5 per cent., payable in Melbourne on September 22.

Redfern's Rubber Works.—A dividend of 9d. per share is announced on the preference shares, but no interim is to be paid on the ordinary shares.

English Velvet and Cord Dyers' Association.—An interim dividend at the rate of 5 per cent. per annum is announced on the cumulative preference shares. Consideration of a dividend on the ordinary shares is deferred until the result of the year's trading has been ascertained.

United Water Softeners, Ltd.—A profit of £521 is announced for the past year. No dividend is to be paid on the ordinary shares and the preference dividend has been deferred.

Jenson and Nicholson, Ltd.—A loss of £7,411 is reported for the past year, which increases the debit to be carried forward to £55,477.

Gas Light and Coke Co.—A dividend for the half-year to June 30 last is announced on the ordinary stock at the rate of £5 12s. per cent. per annum.

W. and H. M. Goulding, Ltd.—The profit for the year ended June 30 amounted to £34,625, against £34,895 for 1931-32. A sum of £6,000 is placed to depreciation account, and after allowing for debenture interest and the preference dividend, it is proposed to pay a dividend of 6 per cent. for the year on the ordinary shares. The balance carried forward is increased from £3,046 to £3,646. The annual meeting will be held on August 8.

Books Received

Infra-Red Photography. By S. O. Rawling. London: Blackie and Son, Ltd. Pp. 58. 3s. 6d.

Bulletin of the Imperial Institute. Vol. XXXI. No. 2. 1933. London: John Murray. Pp. 326. 3s. 6d.

New Companies Registered

Birchall and Co. (Oils), Ltd., Metier Works, College Street, Rochdale.—Registered July 26. Nominal capital £1,000 in £1 shares. Manufacturers of coir oils and compounds, oil manufacturers, merchants, pressers, refiners, and blenders, tallow-melters, soap manufacturers, drysalters, etc. Directors: Mrs. E. H. Birchall, Lulworth, Bamford, Rochdale, and L. Howarth.

Burnett Dyes, Ltd., 8 Princess Street, Huddersfield.—Registered July 28. Nominal capital £2,000 in £1 shares. Manufacturers of and dealers in dyes, dyestuffs and dyewares, chemicals and chemical products, etc. Directors: J. V. Breaks, 12 Highfield Crescent, Heaton, Bradford, G. H. Webster, and W. Breaks.

Coke Oven Products, Ltd.—Registered July 27. The company is limited by a guarantee, not having a share capital. Owners, manufacturers, distillers, refiners, preparers of and dealers in all products produced at and by means of or in connection with the carrying of coke ovens, collieries, gas, tar macadam, slag and chemical works and the like; to purchase from and sell to and on behalf of members and others and manufacture and generally deal in (either as principals or agents) all classes of tar; to carry on the business of oil and spirit distillers and refiners, ship and barge owners and wharfingers, treaters of and dealers in waste products, etc. Subscribers: South Yorkshire Chemical Works, Ltd., Parkgate, near Rotherham; Thorncliffe Coal Distillation, Ltd.; H. E. G. West; United Steel Companies, Ltd.; and C. F. Ward-Jones.

Kephaldol Laboratories, Ltd.—Registered July 26. Nominal capital £42,500 in 40,000 7 per cent. cumulative preference shares of £1, and 50,000 ordinary shares of 1s. each. To acquire the trade mark registered in the United Kingdom of Great Britain and Northern Ireland and the Irish Free State as "Kephaldol," and to carry on the business of importers, exporters and distributors of, agents for and dealers in chemicals and chemical preparations, etc. Directors: G. A. Allen, 30 New Street, S.W.1. F. W. Tanner, A. S. Allen and P. Allen.

SULPHURIC
ALL STRENGTHS
Hydrochloric, Nitric, Dipping, Hydrofluoric, Lactic, Perchloric
F. W. BERK & CO., LTD.
Acid and Chemical Manufacturers since 1870.
106 FENCHURCH ST., LONDON, E.C.3
Telephone: Monument 3874. Wires: Berk, Phone, London.
Works: Stratford, E., and Morriston, Glam.
TAS/Ch.145

OLEUM (all strengths)
Sulphuric, Battery, Dipping, Muriatic, Nitric, and Mixed Acids.
SPENCER CHAPMAN & MESSEL Ltd.
With which is amalgamated WILLIAM PEARCE & SONS, Ltd.
WALSINGHAM HOUSE, SEETHING LANE, E.C.3.
Telephone: Royal 1166. Works: SILVERTOWN, E.16.
Telegrams: "Hydrochloric Fen, London."

BENNETT & JENNER LTD.
SPECIALITIES
LIME BISULPHITE 1060 & 1070
SODA BISULPHITE, SOLUTION
ACID SULPHUROUS,
CALCIUM CHLORIDE, PURE CRYST.
CALCIUM CHLORIDE FUSED
CALCIUM CHLORIDE, FUSED POWDER
DRY CALCIC SULPHITE, 42 SO2
POWDERED SILICA
CLAYPOLE RD., STRATFORD, LONDON, E.
Telephone: Maryland 2058

BRITISH ASSOCIATION OF CHEMISTS
Unemployment Insurance. Over £8,250 paid
Legal Aid. Income Tax Advice. Appointments Bureau
Write for particulars to:—
GENERAL SECRETARY, B.A.C.
"EMPIRE HOUSE," 175, PICCADILLY, LONDON, W.1
'Phone: Regent 6611

DRYING APPARATUS AND DRYING PLANT
FOR ALL PURPOSES
Complete Chemical Plants
PROCESS — ERECTION — OPERATION
Works: CARLISLE
L. A. MITCHELL LTD. Phone: BLA. 7106-7
CHEMICAL ENGINEERS
37 Peter Street, Manchester

ADVERTISERS please note that the latest hour at which we can accept advertisements for insertion in these columns each week is 10 o'clock on Thursday morning.

APPOINTMENTS WANTED

(Prepaid—Twenty-seven words 1s. 6d.; every additional nine words 6d.) Replies can be received "Box , Office of this Journal," in which case our address is included in cost of advertisement, and charged as nine words.

CHEMIST, Graduate Honours, considerable research physical and technical chemistry in England and Dominions, and, having had 12 months' intensive business experience, immediately requires post. Would be willing to invest a small sum with view to partnership.—Box No. 1507, THE CHEMICAL AGE, 154 Fleet Street, London, E.C.4.